FTWFF 19.4
ICPPR 39.0
9/2006

Five-Year Review Report

Second Five-Year Review Report for Fort Wainwright, Alaska

September 2006

Prepared by

United States Army Environmental Center

for

United States Army Alaska
Directorate of Public Works
ATTN: APVR-RPW
730 Quartermaster Road #6500
Fort Richardson, Alaska 99505-6500

UNITED STATES ARMY PROTECTIVENESS STATEMENT

Based on the Statutory Determinations set forth in the Records of Decision for Operable Units 1, 2, 3, 4, and 5, and the results of this Five-Year Review, the United States Army hereby finds that the remedies for all five Fort Wainwright NPL Site operable units are expected to be protective of human health and the environment upon completion, and in the interim, that exposure pathways that could result in unacceptable risk are being controlled.

Approved by:

David L. Shutt Colonel, U.S. Army Commanding	9-27-06 Date

Five-Year Review Report

Second Five-Year Review Report
for
Fort Wainwright, Alaska

September 2006

Prepared by

United States Army Environmental Center

for

United States Army Alaska
Directorate of Public Works
ATTN: APVR-RPW
730 Quartermaster Road #6500
Fort Richardson, Alaska 99505-6500

UNITED STATES ARMY PROTECTIVENESS STATEMENT

Based on the Statutory Determinations set forth in the Records of Decision for Operable Units 1, 2, 3, 4, and 5, and the results of this Five-Year Review, the United States Army hereby finds that the remedies for all five Fort Wainwright NPL Site operable units are expected to be protective of human health and the environment upon completion, and in the interim, that exposure pathways that could result in unacceptable risk are being controlled.

Approved by:

D. L. Shutt — 9-27-06

David L. Shutt — Date

Colonel, U.S. Army

Commanding

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

September 29, 2006

Reply to
Attn Of: ECL-117

Colonel David L. Shutt
Department of the Army
Installation Management Agency
Directorate of Public Works
Headquarters, U.S. Army Garrison, Alaska and Fort Richardson (PROV)
724 Postal Service Loop #4500
Fort Richardson, Alaska 99505-4500

Dear Colonel Shutt:

EPA Region 10 has reviewed the Second Five-Year Review report for Fort Wainwright (FTW), Alaska, dated September 26, 2006 and signed by you on September 27, 2006. The document is a thorough and detailed account of the large amount of work and many accomplishments to date at FTW.

EPA has reviewed the report for technical adequacy, accuracy, and consistency with EPA guidance. EPA's conclusions are based on the information presented in this report and EPA's oversight of the remedial actions at FTW pursuant to the Federal Facilities Agreement with the Army and the Alaska Department of Environmental Conservation.

Based on EPA's review we concur that the remedies for all five FTW National Priority List (NPL) site operable units are expected to be protective of human health and the environment in the short term and that exposure pathways that could result in unacceptable risk are being controlled. The actions at the new Communications source area (Taku Gardens Housing Expansion) are protective in the short-term due to the investigatory work done to date, the actions that have been taken to protect workers and nearby residents via fencing to restrict access, and the Commander's prohibition on the occupancy of the new housing until investigations and any necessary response actions are complete. However, for the Taku Gardens Housing Expansion Area to be protective in the long-term, the recommendations and follow-up actions in the Five-Year Report must be **completed**, including listing this new source area as a source under the FTW FFA, completion of the necessary response actions, and maintenance of the prohibition on occupancy of the new housing until response actions for this new source are complete to the satisfaction of all parties to the FFA.

As with all other NPL sites EPA will be adding these issues and recommendations to our tracking system for follow-up on the Five Year Review Report, and will be including our determination and these recommendations in our Annual Report to Congress.

If you have any questions, please contact Bill Adams at 206- 553-2806 or Jacques Gusmano at 907-271-1271.

Sincerely,

for Daniel D. Opalski, Director
Office of Environmental Cleanup

cc: Sharon Richmond, ADEC
Cristal Fosbrook, USAG-AK
Therese Deardorff, USAG-AK

REGULATORY AGENCY CONCURRENCES

Signature sheet for the second Five-Year Review of Records of Decision, Fort Wainwright, Alaska

Alaska Department of Environmental Conservation

ADEC's concurrence with the findings of this five year review is based on the information presented in the accompanying *Five-Year review Report, Second Five-Year Review Report for Fort Wainwright, Alaska.*

Jennifer L. Roberts

Jennifer Roberts, Section Manager
ADEC Contaminated Site

Sept 29, 2006

Date

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLES — PAGE

FIGURES

PLATES

APPENDICES

LIST OF ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AEC	Army Environmental Center
AEDBR	Army Environmental Database Restoration
ARARs	Applicable or Relevant and Appropriate Requirements
AS	Air sparging
AS/SVE	Air Sparging and Soil Vapor Extraction
AST	Aboveground Storage Tank
AVGAS	aviation gasoline
AWQS	Alaska Water Quality Standard
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene(s)
CANOL	Canadian Oil Line
CCL	Contaminant Candidate List
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLOSES	Cleanup Operations and Site Exit Strategy
COC	Contaminant of Concern
CRAAP	Chena River Aquatic Assessment Program
CRP	Community Relations Plan
cy	cubic yards
CYS	Coal Storage Yard
DCA	1,2-Dichloroethane
DCE	Dichloroethene
DEW	Remote Distance Early Warning
DFs	dioxins / dibenzofurans
DOD	Department of Defense
DPW	Directorate of Public Works
DRMO	Defense Reutilization Maintenance Organization
DRO	Diesel Range (Petroleum Hydrocarbon) Organic Compounds
EBHTF	East Birch Hill Tank Farm
EDB	1,2-dibromoethane

LIST OF ACRONYMS

EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
EQFS	East Quartermaster's Fueling System
ESD	Explanation of Significant Differences
FAA	Federal Aviation Administration
FEP	Fairbanks-Eielson Pipeline
FFA	Federal Facility Agreement
FFT	Fairbanks Fuel Terminal
FS	Feasibility Study
ft-bgs	feet-below ground surface
FTP	Fire Training Pits
GAC	granular activated carbon
GIS	Geographic Information System
GRO	Gasoline Range (Petroleum Hydrocarbon) Organic Compounds
HWL	Horizontal Well
IC	Institutional Control
IRA	Interim Remedial Action
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
ITR	Independent Technical Review
LAAF	LADD Army Airfield
LAFB	LADD Air Force Base
LNAPL	light non-aqueous phase liquids
LTM	Long Term Monitoring
MCLs	Maximum Contaminant Levels
MCLG	Maximum Contaminant Level Goal
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
NCP	National Oil And Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPDWR	National Primary Drinking Water Regulations
NPL	National Priorities List
OB/OD	Open Burning/Open Detonation

LIST OF ACRONYMS

O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
ORC	Oxygen Release Compound
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic aromatic hydrocarbon
PCA	Tetrachloroethane
PCBs	polychlorinated biphenyls
PCE	Perchloroethylene
PDRAR	Preliminary Draft Remedial Action Report
PID	photoionization detector
POL	Petroleum, Oil And Lubricant
PQL	practical quantitation limit
PSE	Preliminary Site Evaluation
RA	Remedial Action
RAB	Restoration Advisory Board
RAGs	Remedial action goals
RAO	Remedial Action Objective
RAR	Remedial Action Report
RBC	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROE	Right of Entry
ROLF	Railcar Off-Loading Facility
RPMs	Remedial Project Managers (USARAK, EPA, and ADEC are remedial program managers under the FFA and Two-Party Agreement)
RRO	Residual Range Organic
SA	Source Area
SARA	Superfund Amendments and Reauthorization Act of 1986

LIST OF ACRONYMS

SC	Sparge Curtain
SOP	Standard Operating Procedure
SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
TAH	Total Aromatic Hydrocarbon
TAL	total analyte list
TAqH	Total Aqueous Hydrocarbon
TBC	To Be Considered (in addition to ARARs)
TCA	Trichloroethane
TCE	Trichloroethene
TCLP	toxicity characteristic leaching procedure
TFS	Truck Fill Stand
TMB	Trimethylbenzene
2-PTY	Two-Party Agreement
µg/L	micrograms per liter
USACE	Army Corps of Engineers Alaska District
USAF	United States Air Force
USAG-AK	United States Army Garrison Alaska
UST	Underground Storage Tank
UXO	unexploded ordnance
VOC	Volatile Organic Compound
WQFS	West Quartermaster's Fueling System

EXECUTIVE SUMMARY

The United States Army Garrison Alaska (USAG-AK) conducted the second Five-Year Review of the remedial actions at the Fort Wainwright National Priorities List (NPL) site, Fairbanks, Alaska, from October 2001 through September 2006. This report presents the results of that review.

The purpose of this review is to ensure that remedial actions selected in the Records of Decision (RODs) for the Fort Wainwright Operable Units (OUs) are being implemented and that they continue to be protective of human health and the environment. To achieve this purpose, this review evaluates the status of implementation of the selected remedies, identifies significant variances from the RODs, and makes recommendations for reconciling variances and/or for improving performance of remedial actions.

This statutory review is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) since all of the RODs for this site were signed after the effective date of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and some of the remedial actions result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unrestricted use and unlimited exposure.

The Fort Wainwright NPL site is comprised of five OUs. Eleven source areas have been identified within these five OUs. Several of the source areas have been further divided into sub-areas. RODs have been signed for all of the OUs; these specify environmental remedies for each of the eleven source areas.

The steps taken in conducting this Five-Year Review focused on answering the following questions:

- Is the remedy functioning as intended in the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

The answers to these questions provided the basis for making conclusions regarding the continued protectiveness of the remedies specified in the ROD for each OU.

The conclusions of this Five-Year Review were that the remedies for all five Fort Wainwright NPL Site OUs are expected to be protective of human health and the environment upon completion, and in the interim, that exposure pathways that could result in unacceptable risk are being controlled.

A new source area, the Communications Site (also known as Taku Gardens) was discovered since the last Five-Year Review. The Fort Wainwright Federal Facility Agreement is in the process of being modified by the agencies' Remedial Project Managers (RPMs) to reflect inclusion of this site into the Agreement. The modification will ensure that the CERCLA requirements and milestones are captured for the short and long-term protectiveness of this site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION

Site name *(from WasteLAN)*: Fort Wainwright, Alaska

EPA ID *(from WasteLAN)*: AK6210022426

Region: 10 **State:** AK **City/County:** Fairbanks, Fairbanks North Star Borough

SITE STATUS

NPL status: ☒ Final ☐ Deleted ☐ Other (specify)____________________

Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete

Multiple OUs?* ☒ YES ☐ NO **Construction completion date:** 2002

Has site been put into reuse? ☐ YES ☒ NO Active Army installation

REVIEW STATUS

Reviewing agency: ☒ EPA ☒ State ☐ Tribe ☒ Other Federal Agency U.S. Army

Author name: U.S. Army Corps of Engineers, Alaska District

Review period:** 10/1/2001 to 9/30/2006

Date(s) of site inspection: 6/6/2006

Type of review: ☒ Statutory

☐ Policy (☐Post-SARA ☒ Pre-SARA ☐ NPL-Removal only

☐ Non-NPL Remedial Action Site

☐ NPL State/Tribe-lead ☐ Regional Discretion)

Review number: ☐ 1(first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify) ____________

Triggering action:

☐ Actual RAA Onsite Construction at OU #___ ☐ Actual RA Start at OU #___

☐ Construction Completion ☒ Previous Five-Year Review Report

☐ Other (specify) __________________________________

Triggering action date *(from WasteLAN)*: 5/30/1996

Due date (five years after triggering action date): 9/30/2006

*"OU" refers to operable unit.

**Review period should correspond to the actual start and end dates of the five-year review in WasteLAN.

FIVE-YEAR REVIEW SUMMARY FORM

Variances:

- Variances are discussed in the "Five-Year Assessment" paragraphs devoted to answering the question "Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?" for each source area within the five OUs.
- No variances currently affecting protectiveness were identified during the five-year review.
- Most variances that were identified pertained to the need to periodically adjust institutional control (restricted use area) boundaries as new monitoring data becomes available.
- An explanation of significant differences (ESD) was prepared for OU3 to address increases in the extent and volume of contamination and other variances from the ROD that do not fundamentally alter the remedial approach at this OU.
- Several COCs now have State of Alaska groundwater MCLs, including aldrin, dieldrin, 1,1,2,2-tetrachoroethane, and bis(2-chloroethyl) ether.

Recommendations and Follow-Up Actions:

- Recommendations and Follow-Up Actions are also discussed in the "Five-Year Assessment" paragraphs devoted to answering the question "Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?" for each source area within the five OUs.
- A summary of recommendations and follow-up actions is included in Section 9 of this report.
- Several off-Post monitor wells that were part of the Birch Hill Tank Farm groundwater monitoring network were recently removed from the former Bentley Trust property by the new property owner; the recommendation is to make every reasonable effort to obtain a signed access agreement for the Army, its contractors, agents, U.S. Environmental Protection Agency (EPA), and Alaska Department of Environmental Conservation (ADEC) to install and monitor new wells on the former Bentley property. The access agreement should provide that no conveyance of title, easement, or other interest in the property shall be consummated without provisions for the continued operation of such wells.
- A new source area (Communications Site, also known as Taku Gardens) has been found at a new housing construction site; the recommendation is to ensure that no houses will be occupied in this area until the site is fully investigated and deemed safe for residential use.
- Two sites, OU3 FEP MP 15.75 and OU4 Coal Storage Yard, are recommended for NFA; the OU5 Chena River Aquatic Assessment Program is also recommended to be discontinued.
- Most recommendations in this report are to continue with groundwater monitoring and evaluation of natural attenuation parameters.
- Several recommendations address evaluating and adjusting the institutional control boundaries in the Army's GIS database.

FIVE-YEAR REVIEW SUMMARY FORM

Protectiveness Statement(s):

- Protectiveness statements were developed using the sequential process described in EPA guidance for conducting five-year reviews.
- At all of the OUs, the remedies are expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.
- While the information at the new source area (Communications Site) could call into question the protectiveness at the site, it does not do so in the short term since workers are protected and occupancy has been prohibited, and in the long term those controls will be maintained as long as necessary to ensure protectiveness.
- Protectiveness statements are developed in Section 10 of this report.

1 INTRODUCTION

The United States Army Garrison Alaska (USAG-AK) has conducted the second Five-Year Review of the remedial actions at the Fort Wainwright National Priorities List (NPL) site, Fairbanks, Alaska, from May through September 2006. Work in support of this review was performed by the U.S. Army Corps of Engineers (USACE) Alaska District and its subcontractors. This report presents the results of that Five-Year Review.

1.1 Purpose

The purpose of this review is to ensure that remedial actions selected in the Records of Decision (RODs) for the five Fort Wainwright Operable Units (OUs) are being implemented and that they continue to be protective of human health and the environment. To achieve this purpose, this review evaluates the status of implementation of the selected remedies, identifies significant variances from the RODs, and makes recommendations for reconciling variances and/or for improving performance of remedial actions. In addition, the review identifies any new information that becomes evident, documents any new contaminant sources or exposure pathways that were discovered, confirms that no new OUs were established, and describes any additional work performed that was not identified in the RODs.

1.2 Statutory Review

This statutory review is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) since all of the RODs for this site were signed after the effective date of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and some of the remedial actions result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unrestricted use and unlimited exposure.

The Army must conduct Five-Year Reviews consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 (c), as amended, states:

> *"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented."*

This requirement is interpreted further in the NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR), which specifies:

> *"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unrestricted use and unlimited exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."*

The Environmental Protection Agency (EPA) Five-Year Review guidance states that "the first five-year review generally should be completed and signed by the EPA Region within five years of the initial trigger date", and "for the purpose of a five-year review, a remedial action typically is initiated on the date of 'actual Remedial Action (RA) on-site construction' or the 'actual RA start' date for Federal facilities." The date of actual RA on-site construction generally corresponds to the date the contractor begins work at a site for the remedial action, typically the date of on-site mobilization.[1] The first remedial action at the Fort Wainwright NPL site was for OU3, initiated on May 30, 1996.[2]

Five-year review guidelines state that "an entire site is subject to a statutory review if any one of its remedial actions is subject to a statutory review."[3] Therefore all five OUs at Fort Wainwright are included in this review.

1.3 Agency Oversight Agreements

1.3.1 Federal Facility Agreement

A Federal Facility Agreement (FFA) for Fort Wainwright was signed by the U.S. Environmental Protection Agency (EPA, Region 10), the Alaska Department of Environmental Conservation (ADEC), and the United States Department of the Army in March 1992. The FFA ensures that environmental impacts associated with past practices at Fort Wainwright are investigated and remedial actions are completed to protect human health and the environment. This agreement sets deadlines, objectives, responsibilities, and procedural framework for implementing the Installation Restoration Program (IRP) at Fort Wainwright.

The FFA establishes and describes the CERCLA process as applied to Fort Wainwright. It is in the FFA that the use of preliminary source evaluations (PSEs) was established to better define the scope of the Remedial Investigation / Feasibility Study (RI/FS) activities. The PSE approach was adopted to facilitate the use of information previously collected under the Army's IRP in order to identify additional areas of concern, to expedite interim remedial actions, and to screen the numerous sites of potential concern to identify those sites that warranted remedial investigation (RI). PSE reports were used as lead-in documents to OUs and the RI/FS process.

An additional goal of the FFA is to integrate the Army's CERCLA response obligations and Resource Conservation and Recovery Act (RCRA) corrective action obligations at this site. The FFA states that remedial actions implemented under this agreement will be protective of human health and the environment such that remediation of releases shall obviate the need for further corrective actions under RCRA (i.e., no further corrective action shall be required for source areas).

Each of the parties to the Fort Wainwright FFA is represented by a Remedial Project Manager (RPM).[4] These RPMs meet regularly to discuss the Army's progress regarding remedial actions selected in the RODs and to address related issues as they arise during the course of remedial action. The RPMs meet more frequently than quarterly when needed, and routinely make themselves available to each other for purposes of Fort Wainwright remediation (e.g., for technical reviews, modifying monitoring programs, etc.) and to meet the intent and commitments of the FFA.

---

[1] The definition of the "actual RA start" varies as outlined in the Superfund/Oil Program Implementation Manual (SPIM). OSWER Directive 9200.3-14-1G-P.

[2] Source: EPA WasteLAN

[3] Source: Section 1.4.1 EPA Comprehensive Five-Year Review Guidance

[4] The term "RPMs" is used in this report to refer to the representatives from these three organizations (EPA, ADEC, and the U.S. Army).

1.3.2 Remedy Protectiveness, Optimization and Cost-Effectiveness

Optimization of remedy and assessment of cost effectiveness is an on-going process for the Fort Wainwright NPL site. Performance of remedies is evaluated at all FFA meetings and discussed by the RPMs more frequently, as needed. Upon approval of the RPMs, operation of treatment systems is modified as necessary to ensure efficacy and best use of resources. Such modifications have typically included adjusting periods of operation of air sparging (AS) and soil vapor extraction (SVE) systems, decisions to terminate operation, decisions to restart operation, decommissioning treatment systems, and moving treatment systems to new locations. Changes are presented in system operations annual reports. Groundwater monitoring programs are updated at least annually based on findings from the preceding year to ensure that well locations and sampling regimes are meeting the objectives of the RODs.

Fort Wainwright also negotiated a Two-Party Agreement (2-PTY) with ADEC in 1992. This Agreement sets the framework to cooperatively address petroleum, oil and lubricant (POL) contamination caused primarily by leaking underground storage tanks and surface spills at the post.

The 2-PTY acknowledged that all parties to the FFA, being negotiated at the time the 2-PTY was signed, agreed to allow the Army to initially address the clean-up of these areas of petroleum contamination in accordance with the state's statutes, regulations, and Interim Guidance, with a review by the RPMs at the time of the OU5 ROD to ensure that petroleum sites were being adequately addressed.

Appendix D to the OU5 ROD included the January 1998 "Recommended Action, Fort Wainwright Petroleum Strategy", signed by the parties to the FFA. This appendix verified the strategies developed by the Army and ADEC to address the known POL contaminated source areas on Fort Wainwright.

1.4 Public Involvement

1.4.1 Community Involvement at Fort Wainwright

Community involvement activities began at Fort Wainwright in 1992 when community interviews were conducted to support an area-wide Community Involvement Plan (CIP) for Fort Wainwright. The final version of the CIP was published in April 1993 and covered the status of investigations and cleanup activities for the five OUs on Fort Wainwright. The CIP was revised and updated in 1997.

Fort Wainwright published its first quarterly newsletter in July 1993. Quarterly newsletters, covering information about all OUs, 2-PTY agreement sites, and other restoration activities, have been published quarterly and sent to interested community members since 1993.

Prior to the formation of the Restoration Advisory Board (RAB) Fort Wainwright conducted several informational public meetings. The first meeting was conducted in July 1993, which covered information about each of the five OUs. In addition, OU specific public meetings were held in conjunction with a public comment period for each of the associated Proposed Plans. The proposed plan public meetings presented investigative information and proposed cleanup plans for each of the OUs with a focus on receiving public comments on the proposed actions. The public was offered several different venues for providing public comments: written, verbal, and via a toll-free telephone comment line.

In 1994 an Information Repository for Fort Wainwright restoration activities was established at the Noel Wien Library in Fairbanks and the Fort Wainwright Post Library. The Administrative Record was established and is currently maintained at the Directorate of Public Works library, Building 3023, on Fort Wainwright. The Administrative Record has been updated as appropriate since its inception.

1.4.2 Restoration Advisory Board

A RAB was established for the Fort Wainwright NPL site in 1997, with the first meeting held in September of that year. RAB meetings were initially held quarterly with an excellent community turn out. In 2001, public interest in the RAB began to decline as major concerns at the site were addressed. Starting in 2002, meetings were held semi-annually. Attendance continued to dwindle with generally the community co-chair and one other community member (non-RAB member) in attendance. Finally in 2003, the community co-chair recommended adjournment. According to the Adjournment Report, the RAB was adjourned “because the installation has all remedies in place, the remedies are operating properly and successfully, and there is no longer sufficient, sustained community interest in the RAB.” The last meeting was held on July 15, 2003.

The RAB included members of the Fairbanks business community, installation residents, local environmental groups, local residents, and a member of the Tanana Chiefs Conference (an Alaska Native organization). Government members include representatives of EPA Region 10 and ADEC.

When the RAB met, the Army would present technical briefings and members of the RAB would have the opportunity to share their concerns about the site and provide advice on remediation studies and remedial actions. Although the RAB was adjourned, the Army continues to look for opportunities to keep the community informed and involved in the remediation process. One way this is done is through the quarterly newsletter, which is sent to former RAB members as well as various community members, and local community organizations each quarter.

The Army’s IRP, the RAB, the FFA, and the 2-PTY effectively ensure public involvement in and environmental agency oversight of the remediation process at Fort Wainwright. The active nature of military operations at Fort Wainwright ensures an ongoing federal presence and has contributed to the Army’s ability to meet the commitments in the RODs.

1.4.3 Community Involvement During the Five-Year Review

The Five-Year Review is an important milestone for public involvement at a NPL site. The public was informed of the Fort Wainwright Five-Year Review as follows:

- A notice of the Five-Year Review was published in the *Fairbanks Daily News Miner* on Wednesday, June 14, and Sunday, June 18, 2006, and in the June 23, 2006 issue of the *Alaska Post* (a newsletter for Army posts throughout Alaska, including Fort Wainwright). A copy of this notice is provided below.

- A notice of the Five-Year Review was placed in the fall 2006 Fort Wainwright *Environmental Restoration News.*

- Interview forms were sent to each of the former RAB members on record asking for their comments, opinions, and/or recommendations on the remedial activities at Fort Wainwright.

- Following completion of the Five-Year Review, a notice of availability will be published in the *Fairbanks Daily News Miner* notifying the public of the availability of the review, and the Review Report will be added to the Administrative Record and placed at the Fort Wainwright NPL site public information repositories.

Copy of Five-Year Review Notice that was published in the *Fairbanks Daily News Miner* and the *Alaska Post*

NOTICE OF FIVE-YEAR REVIEW

U.S. Army Alaska (USARAK) announces the beginning of the Five-Year Review of soil and groundwater remedies implemented at the Operable Units on Fort Wainwright, Alaska (FWA).

Section 121 (C) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan state "a remedial action that resulted in hazardous substances, pollutants, or contaminants remaining at the site shall be reviewed no less frequently than every five years." Thus, CERCLA requires a statutory Five-Year Review of the selected remedial actions at Fort Wainwright.

USARAK initiated the Five-Year Review process in April 2006 and it will be completed by September 2006.

The findings of the Five-Year Review will be available for public review after September 2006 at: Noel Wien Library in Fairbanks; Fort Wainwright Post Library; and Directorate of Public Works CERCLA Library, Building 3023, on Fort Wainwright. These three libraries contain detailed information concerning the selected remedies at Fort Wainwright and the contamination addressed by the remedies.

Information on the cleanup process is distributed to interested persons through the FWA Restoration Newsletter. If you are interested in receiving the newsletter or if you have any questions regarding the Five-Year Review process, questions may be directed to:

Joe Malen, U.S. Army Alaska Directorate of Public Works
ATTN: IMPA-FWA-PWE (J. Malen)
1060 Gaffney Rd., #4500, Ft Wainwright, AK 99703-4500
(907) 353-4512 – joseph.malen@us.army.mil

2 APPROACH

2.1 Report Organization

The Five-Year Review was performed in accordance with the *Interim Army Guidance for Conducting CERCLA Five-Year Reviews* (U.S. Army 2001) and *EPA Comprehensive Five-Year Review Guidance* (EPA 540-R-01-007, OSWER No. 9355.7-03B-P, June 2001).

The basic report structure is derived from the EPA guidance document, modified to accommodate all five Fort Wainwright RODs and multiple source areas within OUs. To the extent possible, discussion related to all of the OUs appears at the beginning of the report and OU-specific discussion appears in the different OU sections of the report. Source areas are addressed separately within the OU sections, while discussion of sub-areas is presented under source area headings.

One of the goals of this report is to compile information from existing reports for all of the OUs into a single status document. To make best use of resources, this report has taken much discussion and information from the RODs, other reports, and Army summaries. Findings that were overseen, reported, reviewed, and accepted by the Fort Wainwright RPMs, have generally been included in the Five-Year Review report without further scrutiny.

The findings and recommendations sections of this report document ongoing issues and concerns, identify variances in the implementation of remedial actions, and suggest changes to ensure that remedial actions undertaken pursuant to the RODs are adequately protective of human health and the environment

2.2 Five-Year Review Team

This Five-Year Review was performed at the direction of the Army Environmental Center (AEC), with guidance by USAG-AK Directorate of Public Works (DPW) Environmental Office[1] (federal lead agency for this site), and with EPA Region 10 and ADEC oversight pursuant to the FFA and 2-PTY. This work was conducted by the USACE and its subcontractors.

2.3 Five-Year Review Tasks

The objectives of the Five-Year Review are to answer the following questions:

- Are the remedies functioning as intended by the decision document?
- Are the assumptions used at the time of remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?
- Are human health and the environment being protected in the short- and long-term?

[1] Referred to as "DPW" for the remainder of this report

The Five-Year Review has been accomplished by five major tasks:

- Review of relevant documents in the Administrative Record including but not limited to the RODs, Explanation of Significant Differences (ESD), Remedial Design/Remedial Action (RD/RA) Reports, Drawings and As-Builts to determine the initial effectiveness of the remedies
- Review of Operation and Maintenance (O&M) Reports, Monitoring Plans, and Annual Sampling Reports to determine the ongoing effectiveness and protectiveness of the chosen remedies
- Review of chemical, location, and action-specific Applicable or Relevant and Appropriate Requirements (ARARs) identified in the RODs for each OU to determine whether changes have occurred which might affect the protectiveness of the remedies
- Site inspections to observe visible elements of remedies
- Interviews of operation and maintenance personnel and remediation contractors

2.3.1 Document Review

Documents consulted in the course of this Five-Year Review include:

- *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P (EPA, June 2001)
- First Five-Year Review Report for Fort Wainwright (September 2001)
- RODs for OUs 1 through 5
- Remedial Designs (RDs) (including drawings and as-builts)
- Remedial Action Reports (RARs)
- ESD
- O&M reports and manuals
- Ground water sampling results
- Other sampling results, monitoring data, and summaries

A compilation of reports and documents available at the time of this review is provided in Appendix A. Key information sources used in this review are identified in this table.

2.3.2 ARARs and Numeric Cleanup Goal Review

As part of this five-year review, significant ARARs for each ROD were reviewed for changes or the promulgation of new laws since the ROD was signed that might be considered ARARs if the

RODs were to be written today.[2] As part of this review, remedial action objectives were reviewed, and contaminant-specific standards used to set numeric cleanup goals in each ROD were compared to present day values to assess continued protectiveness of the remedies. More specifically, current Maximum Contaminant Levels (MCLs) and toxicity and/or carcinogenicity values were compared to MCLs and toxicity/carcinogenicity values at the time of the RODs.

The OU specific Remedial Action Objectives (RAOs), ARARs, and cleanup goals are discussed in the OU sections of this report. A table showing the cleanup goals for each of the OUs is provided in the table in Appendix B.

2.3.3 Site Inspection

Site inspections were conducted June 6th, 2006. Site inspection checklists for each site are provided in Appendix C of this report. Photographs taken during the site inspections are included in Appendix C as well. Because Fort Wainwright is a site with ongoing Army presence and agency oversight, it was possible to discuss project status with a variety of people familiar with site history and status of remediation.

The Fort Wainwright NPL site public information repositories were also inspected to confirm availability of Administrative Record documents for public review. The findings and recommendations from the repository inspections are included in the Appendix D of this report.

2.3.4 Interviews

During the course of this Five-Year Review, written interviews were conducted with several parties involved with the site, including former RAB members, remedial project managers, and technical or regulatory personnel. A list of those interviewed, as well as a compilation of the Interview Record Forms documenting the issues discussed during these interviews are provided in Appendix E of this report.

Interview responses were very positive. Interviewees indicated that they felt the work being done at all of the OUs was moving forward as planned and that the public had been kept informed of the progress being made. There was some concern raised over changes of land use designations at some sites.

---

[2] New laws that might be considered ARARs today need only be addressed for Fort Wainwright if essential to ensure protectiveness of the remedies (as specified in the "Comprehensive Five-Year Review Guidance", EPA, 2001).

3 FORT WAINWRIGHT NPL SITE BACKGROUND

This section is an overview of the post wide Fort Wainwright NPL site. Background information on the individual OUs is presented in the OU specific sections of this document.

3.1 Post History

The United States Army Fort Wainwright has been used by the Department of Defense (DOD) for military operations continuously since 1938. Originally known as LADD Army Airfield (LAAF), the post was established for cold weather experimentation. During World War II, LAAF served as a transfer point in the lend-lease program. Between 1942 and 1945, almost 8,000 combat and transport aircraft were transferred to Soviet aircrews at LAAF. In 1947, the newly formed United States Air Force (USAF) assumed control of LAAF, which was redesignated as LADD Air Force Base (LAFB). LAFB served as a resupply and maintenance base for the Remote Distant Early Warning (DEW) sites and experimental ice stations in the Arctic Ocean. During the Korean conflict, LAFB served as part of the defense network, and was the site of the first Nike Hercules Missile launch from a tactical missile site in December 1959.

On January 1, 1961, the United States Army resumed control over LAFB. The Army renamed the installation Fort Wainwright, after General Jonathan M. Wainwright, the commander of the forces defending the Bataan Peninsula in the Philippines at the beginning of World War II.

Fort Wainwright has been home to several units, including the 171st Infantry Brigade (Mechanized), a Nike-Hercules Battalion, the 172nd Infantry Brigade, and the 6th Infantry Division (Light). In July 2001, the Army announced its intent to make the 172nd Infantry Brigade, located at Forts Wainwright and Richardson, into one of the next four interim brigade combat teams as part of its transformation to a more strategic and responsive force.

The 172nd Stryker Brigade Combat Team is currently the major unit at Fort Wainwright. Subordinate commands include the 2nd Battalion, 1st Infantry Regiment; 1st Battalion, 17th Infantry Regiment; 4th Battalion, 11th Field Artillery and 123rd Aviation Regiment; 172nd Brigade Support Battalion; and the 4th Squadron, 14th Cavalry Regiment. Fort Wainwright is also home to the Medical Activity-Alaska and Dental Activity-Alaska, and the Bassett Army Community Hospital. In the past decade, many new sets of family quarters have been built, as well as a PX/Commissary mall, physical fitness center, and maintenance facilities.

Fort Wainwright currently employs a large Department of the Army and DOD Civilian work force and serves a daily population of over 12,000 people, including soldiers, family members, civilian employees, contractors, and other tenants such as the Army's Cold Regions Test Center, and the Bureau of Land Management's Alaska Fire Service.

3.2 CERCLA History

Fort Wainwright was proposed for placement on the CERCLA NPL in July 1989, due to releases of hazardous substances, pollutants, and contaminants into the environment. The Army's investigation of contaminated sites at Fort Wainwright under the IRP began in 1989, and the post was added to the CERCLA National Priorities List in 1990. EPA Region 10 and the ADEC began working closely with the Army to better understand the nature and extent of contamination at Fort Wainwright and its threat to human health and the environment. The three parties negotiated the Fort Wainwright NPL Site FFA, which was signed in 1992, and the Army and ADEC also entered into a 2-PTY Agreement to address POL sites in 1992.

As part of negotiating the FFA, the RPMs initially identified source areas from the RCRA Facility Assessment, Westin Facility Assessment, and numerous interviews from past and present employees and community members. From this process, 51 potential CERCLA source areas and multiple petroleum areas were identified on Fort Wainwright. Attachment I to the FFA describes the investigation and restoration approach agreed upon by the RPMs.

As of the signing of the FFA, the RPMs agreed that 32 of the originally identified CERCLA eligible source areas were placed into OUs. The remaining 19 source areas were evaluated by the RPMs as requiring no further action planned based on the screening criteria outlined by the RPMs. In addition to CERCLA source areas, POL sources were identified through previous studies, reports and interviews. Documents are located in the Administrative Record.

The FFA identified the use of PSEs to better limit the scope of the RI/FS. PSEs were used as lead in documents to OUs and the RI/FS process. Each potential source areas was placed in one of five OUs based on the following criteria: availability and sufficiency of data; similarities of source areas; complexity and size; and affected media, migration potential and exposure pathways. The following shows the original number of source areas in each of the five OUs:

- OU1 PSE 1: 19 source areas
- OU2 PSE 2: 7 source areas
- OU3 RI/FS: 2 source areas
- OU4 RI/FS: 3 source areas
- OU5 RI/FS: 1 identified source area; plus petroleum sources not adequately addressed through other programs (none were named) and any newly discovered sources[1]

The history of contamination and remediation of source areas are summarized in the OU-specific sections of this report. Table 1 in Appendix F identifies each of the source areas by OU and provides additional information about their current status.

In 1999, a U.S. Army Independent Technical Review (ITR) was conducted at Fort Wainwright, focusing on the three active sites associated with OU3 (FTWW-055, the Birch Hill Tank Farm; FTWW-083, the Railroad Off-Loading Facility; and FTWW-084, the Fairbanks-Eielson Pipeline Spills). This report indicated that the remedial actions underway were correct, adequate, and were protective of human health and the environment. The ITR team concluded that an ESD be developed. An ESD documents new information received or generated after signature of the ROD that could affect implementation of the original remedy selected. Specifically, an ESD was prepared in 2002 for OU3 to document increased volume and aerial extent of contamination, increase in remedial cost, discovery of additional source areas and changes in some components of the selected remedy. This did not fundamentally alter the overall remedial approach. Additional discussion of the ESD is included in Section 6.

[1] OU5 was the last scheduled RI/FS to be initiated at Fort Wainwright. The objective was to complete a comprehensive post-wide investigation. Any source areas that were not previously screened out or otherwise resolved as not constituting a threat to human health or the environment were covered under this RI/FS.

A "Superfund Site Preliminary Closeout Report" for Fort Wainwright was issued and signed in 2002. This document stated that the "U.S. Army, under the oversight of the Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC), completed all construction activities for Fort Wainwright Army Post, Fairbanks, Alaska in accordance with Procedures for Completion and Deletion of National Priority Sites and Update (OSWER Directive 9320.2-09A-P)." The document went on to state that, because there are numerous long-term remedial systems operating at Fort Wainwright, a final closeout report will be prepared once the RAOs for the various OUs have been achieved.

3.3 Land and Resource Use

Fort Wainwright is located within the Fairbanks North Star Borough in interior Alaska and occupies 918,000 acres on the east side of Fairbanks. Fort Wainwright consists of a main post area, which is two miles east of Fairbanks between the Chena and Tanana Rivers and has a cantonment area, a small arms range complex, and a close in range complex. The main post was originally established as a cold-weather testing station. The Tanana Flats Training Area is across the Tanana River from the main post, and the Yukon Training Area is 16 miles east-southeast of Fairbanks, adjacent to Eielson Air Force Base. Figure 3-1 provides a map of Fort Wainwright and the surrounding area.

The Fairbanks North Star Borough is lightly populated with several scattered developments. The City of Fairbanks (population 35,000) is on the western boundary of Fort Wainwright.

Primary missions at Fort Wainwright include training infantry soldiers in the arctic environment, testing equipment in arctic conditions, preparing troops for defense of the Pacific Rim, and rapid deployment of troops worldwide. On-site industrial activities include operation, maintenance, and repair of fixed-wing aircraft, helicopters, tactical and non-tactical vehicles. On-site industrial activities include drinking water production, power generation, and steam heat production.

Groundwater is the only source of potable water used at Fort Wainwright and the Fairbanks area. Approximately 95% of Fort Wainwright's potable water is supplied through a single distribution system fed by two large-capacity wells located in Building 3559, near the Post Power Plant (see Figure 3-1). These wells are completed at a depth of approximately 80 feet below ground surface (bgs) and provide between 1.5 million and 2.5 million gallons of water per day to the Post Water Treatment Plant for processing and distribution. In addition to the main drinking water supply wells, there are five emergency standby supply wells located around the cantonment area. These wells have been completed between 80 and 120 ft-bgs and are capable of pumping approximately 250,000 gallons per day per well.

Golden Heart Utilities has four developed wells located one and a quarter miles downgradient of the Post's boundaries, on the banks of the Chena River (see Figure 3-1). All municipal water users are currently supplied from the Golden Heart wells. At one time, College Utilities also supplied water from three water wells located along the Chena River, but these wells have not been used since 2002.

For purposes of CERCLA and 2-PTY remediation, groundwater use at, and potentially affected by, Fort Wainwright source areas is considered residential.

Fort Wainwright has established a Post-wide Institutional Control (IC) policy for all known or suspected contaminated sites. The base-wide IC policy is outlined in greater detail in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash – Fort Richardson, Alaska. This policy was last updated in 2001, but is currently under review and a new update is expected in 2006. Plate 1-I of this Five-Year Review depicts the restricted use boundaries for all sites within Fort Wainwright.

3.4 Physical Characteristics

Fort Wainwright is underlain by soil and unconsolidated sediment that consist of silt, sand, and gravel that ranges in thickness from 10 feet to more than 400 feet before encountering bedrock. A five-foot-thick surficial soil layer of fine-grained soil overlies the deeper alluvial deposits. Alluvial floodplain deposits underlay the surface soils and consist of varying proportions of sand and gravel which are commonly layered. Where present, permafrost forms discontinuous confining layers that influence groundwater movement and distribution. The depth to permafrost, when present, ranges from 2 to 40 ft-bgs. The greater depths are found on cleared and developed land surfaces, where thermal degradation of underlying permafrost occurs.

The Chena River flows through Fort Wainwright and the City of Fairbanks, and eventually into the Tanana River south of the Post. The Tanana River borders the south portion of Fort Wainwright. The main aquifer in the Fort Wainwright area is the Tanana Basin alluvial aquifer, a buried river valley. This aquifer ranges from a few feet thick at the base of Birch hill to at least 300 feet thick under the post's main cantonment area. The aquifer may reach a thickness of 700 feet in the Tanana River valley. Groundwater in the Tanana-Chena floodplain generally is considered to be unconfined in permafrost-free areas. A confined aquifer may develop seasonally where the depth to the water table is less than the depth of the seasonal frost penetration.

Groundwater movement between the Tanana and Chena Rivers generally follows a northwest regional direction, similar to flow direction of the rivers. Seasonal changes in groundwater flow directions of up to 180 degrees are not uncommon in the area due to the effects of changing river stages in the Tanana River and, to a lesser extent, the Chena River. Groundwater levels near the Chena River fluctuate greatly because of river stage and interactions with the Tanana River. Typically, groundwater levels rise during spring breakup and late summer runoff, and drop during fall and winter when rainfall decreases and precipitation becomes snow.

3.5 History of Contamination

Beginning in 1938, fuels, waste solvents, and pesticides were disposed of on the ground. Spills associated with fuel management, storage, transportation, and handling were common. In addition, waste oils, solvents, and contaminated fuels were incinerated at the post power plant and fire training areas, a practice which was discontinued in 1993. Waste oils commonly were used for dust control. Underground storage tanks (USTs) for waste oil, fuel, lubricants, and solvents were installed at most maintenance facilities. A majority of these tanks eventually leaked and released contaminants to soil and groundwater. All existing USTs were removed and/or replaced with double walled, cathodically protected, tanks with leak detection systems.

Pesticides (insecticides, herbicides, fungicides, avicides and rodenticides) have been used over the years to maintain grounds and structures and to prevent pest-related health problems. Pesticides were reported to have been mixed on inadequate surfaces and/or stored in such a way to allow releases to the soil.

Current Army practices no longer include uncontrolled releases of pollutants to the environment.

4 OPERABLE UNIT 1

4.1 OU1 Background

Operable Unit 1 (OU1) originally consisted of 19 potential source areas, but an additional three sites were added from OU2 in 1997 to make a total of 22 source areas. All but one of these sites, the 801 Drum Burial Site, have either been recommended for no further action (NFA) or transferred to other programs (such as the 2-PTY).

The list of OU1 source areas and their status is shown in Table 4-1 and in Appendix F.

Table 4-1. List of OU1 Source Areas and Their Current Status

Source Area	Current Status / Date of Action
Alaska Railroad Storage Yard	NFA / 6 Jan 1995
Beacon Tower Drum Site (Landfill)	NFA / 26 Jun 1992
Blair Lakes Drum Site	NFA / 25 Jul 1994
Birch Hill Radioactive Waste Site	NFA / 21 Mar 1993
Building 1128 Transformer Yard Drum Site	NFA / 26 Jun 1992
Building 1567	NFA / 10 Apr 1995
Building 1599	Referred to 2-PTY / ROD
Building 2077	Referred to 2-PTY / ROD
Building 2250	NFA (for pesticides) / 6 Jan 1995 (referred to 2-PTY for fuel products)
Building 3015	Referred to 2-PTY / 10 Apr 1995
Burial Site M	NFA / 26 Jun 1992
Chemical Agent Dump	NFA / ROD
Drum Site West of DRMO (Site N-4)	NFA / ROD
Former Explosives Ordnance Detonation (EOD) Range	Referred to OU5 / ROD
Motor Pool Buildings	Referred to OU5 / ROD
Runway Radioactive Waste Site	NFA / 26 Jun 1992
Trainor Gate Railroad Spur	NFA / 30 Sep 1992
Transformer Storage Yard East of 3019	NFA 25 Jul 1994
Utilidor Expansion Drum Site	NFA / 26 Jun 1992
Engineer Park Drum Site (moved from OU2)	NFA / 25 Jul 1994
Drum Site South of the Landfill (moved from OU2)	NFA / 25 Jul 1994
801 Drum Burial Site (moved from OU2)	Remedial Action (long-term monitoring) / ROD

NFA decisions were made for the majority of the sites based on 1) the physical location could not be identified, 2) no visible sign of contamination was observed during inspections, or 3) environmental sampling results showed that contamination was below the protective human health based levels. A description of these NFA decisions can be found in the OU1 ROD and the administrative record.

In 1995, an Interim Remedial Action (IRA) was conducted at one of these sites: the Chemical Agent Dump Site. The IRA indicated that chemical warfare materials were not present at this site and a NFA decision was recommended under this ROD. Information on this source can be found in the IRA ROD Chemical Agent Dump Site and the administrative record.

Two sites, the Motor Pool Buildings and the Former Explosive Ordnance Detonation Range, were transferred to and addressed under the OU5 decision process.

Four of these sites were carried through RI: Building 1599, Building 2077, Site N-4, and the 801 Drum Burial Site. Subsequent IRP management of these source areas was based on the results of the RI, which came to the following conclusions:

- Buildings 1599 and 2077 were referred to the 2-PTY, since the only contaminants of concern at these two locations consisted of petroleum hydrocarbons.
- Site N-4 was found to require NFA.
- The 801 Drum Burial Site was recommended for further action based on the potential risk to human health and the environment, under the OU1 ROD.

4.2 801 Drum Burial Site

4.2.1 Overview

The 801 Drum Burial Site (Figure 4-1) is located between the west bank of the Chena River and River Road and south of the Alaska railroad bridge. It covers an area of approximately 20 acres. The site was discovered during construction of a storm sewer in the summer of 1992, as part of the 801 contract housing construction project. Numerous drums were reportedly removed from the area during initial construction. In the fall of 1992 and in 1993, excavation and drum removal activities were undertaken. Sampling results showed elevated levels of POL, pesticides and solvents in soil and groundwater at this location. Additional drums and contaminated soil were found and removed during the 1995 RI and the 1996 follow up investigation. During the 1996 investigation, 850 cubic yards (cy) of contaminated soil were removed from the site and stockpiled for later use in a phytoremediation treatability study (see Sec 4.3). The ROD was signed in June 1997.

A total of 16 monitoring wells have been installed across the site to determine potential contamination migration. These wells have been included in a monitoring network; sampling was conducted annually from 1998 until 2005 when a 5-year sampling schedule was implemented. Starting in 2001, the annual sampling schedule was modified to include just two wells (AP-7163 and AP-7282) for the first two years, and all 16 wells would be sampled every third year. Using this schedule, a comprehensive sampling effort was conducted in 2003, and then again in 2005 (a year early). A cleanup operations and site exit strategy (CLOSES) evaluation was conducted in 2003/04 that recommended monitoring at the site on a 5-year schedule. Based on that recommendation, the current plan is to continue long-term monitoring at the site every 5 years, with sampling events occurring prior to five-year reviews. ICs are in place, and an informational sign was installed at this source area in 2001 to inform the public of restricted activities at this site; the sign was updated and repaired in 2004 and 2005.

EPA determined this remedy to be operational and functional as of May 30, 2001. The Operations and Maintenance Manual was submitted in December 2000, and the Interim Remedial Action Report was received in April 2001.

Periods of use and dates related to the history of the 801 Drum Burial Site source area contamination and remediation are summarized in Table 4-2.

Table 4-2. History of Regulatory Events at OU1 801 Drum Burial Site[a]

Event	Date
Drum storage and disposal activities	1950s & 1960s
Fort Wainwright added to NPL	August 1990
PSE conducted and 801 Drum Burial Site assigned to OU2 for RI/FS	1991
Buried drums discovered during construction of storm sewer. Geophysical survey conducted and two anomalies discovered.	1992
FFA signed	1992
2-PTY Agreement signed	1992
PSE2 conducted followed by excavation and removal of 92 drums from site, 18 containing some amount of product. Drilling, installation, and sampling of 6 groundwater monitoring wells and 18 microwells performed.	1992 & 1993
801 Drum Burial Site transferred from OU2 to OU1 and 3 additional monitoring wells installed. Geophysical survey conducted and four additional areas located for further investigation.	1994
Management Plan, OU1, Remedial Investigation/Feasibility Study issued	August 1995
Limited excavation conducted; 34 drums (8 containing some amount of product) removed. Two additional monitoring wells installed and sampled.	1995
Additional geophysical surveys conducted and 118 drums were subsequently removed, 46 containing some amount of product. 850 cy of pesticide-contaminated soil removed during excavation and stockpiled on site in two lined containment cells for later management[b]. Six additional monitoring wells installed and the first quarterly groundwater sampling performed.	September 1996
Proposed Plan for Remediation for OU1 issued	February 1997
Stockpiled soils removed from site for final disposition	1997
OU1 Record of Decision signed	June 1997
Additional excavations performed based on previous geophysical surveys but no additional drums discovered	October 1997
Final OM&M for 801 Drum Burial Site issued	December 2000
Interim Remedial Action Report issued	May 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002
CLOSES Evaluation for OU1 801 Drum Burial Site issued	April 2004

[a] Information in this table was obtained from the OU1 IAP; OU1 OM&M Plan; and the Five-Year Review Report Document Log.
[b] This soil was used in a treatibility study that tested phytoremediation technology (see Sec. 4.3).

4.2.2 Background

Physical Characteristics

The 801 Drum Burial Site is approximately 0.13 miles east of the 801 Military Housing Area on the east side of River Road and near the west bank of the Chena River. The area is in a small depression between River Road and the Chena River and is currently undeveloped and vegetated with grass, brush and trees. No endangered or threatened species reside in the area.

The depth to groundwater in the area of the 801 Drum Burial Site is shallow, varying from about 5 to 15 ft-bgs across the site. Monitoring of groundwater levels has shown groundwater flow direction to be generally consistent with the regionally west-northwesterly flow direction. However, because the site is located so close to the Chena River, the groundwater flow direction and gradient can fluctuate seasonally in response to the water level and flow of the river. During periods of high water and flow in the Chena River, the groundwater flow direction on site is generally to the west, away from the river. During low water and flow, usually in the winter and early spring, the groundwater flow direction is eastward, toward the river.

History of Contamination

The 801 Drum Burial Site formerly was used as a drum storage area and disposal area. Drums stored at this source area reportedly contained diesel fuel, gasoline, jet fuel, solvents, asphalt, pesticides, and lubricants. Aerial photographs from the 1950s and 1960s indicate that a pit was in the southwest corner of the storage area. Subsequent aerial photographs show that the pit was filled. During summer 1992, buried drums were found during construction of a storm sewer that runs west-east through the source area and outfalls in the Chena River. Numerous drums were removed during these construction activities.

Land and Resource Use

The 801 Drum Burial Site is across River Road from a military housing area; it is between the housing area and the Chena River. The ROD described land use at this source area as recreational. The land use is expected to remain recreational due to its location and the access it provides to the Chena River. River Road is elevated at this location, providing a physical barrier that prevents typical surface water runoff from reaching the housing area. The road directs local surface water runoff to the Chena River, which is directly adjacent to the source area.

Some non-military residents north of the Chena River obtain drinking water from the College Utilities well located approximately 1.25 miles west of the Post on the southern bank of the Chena River. Downgradient of the 801 Drum Burial Site, there are residential and commercial wells that provide residential and bottled drinking water respectively. Residents of the 801 Military Housing Area obtain their drinking water from the Golden Heart Utilities water system. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located downgradient of the source area and in the same unconfined aquifer.

Pre-ROD Response

As part of the PSE process at the 801 Drum Removal Site from 1991 to 1993, numerous geophysical surveys were conducted. Ninety-two (92) drums were removed from this area during 1992-93, and another 34 were removed in 1995. Drum contents were sampled and found to contain aqueous liquid, organic solids, flammable organic liquid, and chlorinated organic liquid.

Based on the findings of the geophysical surveys, another removal action was conducted in 1996 and an additional 118 drums (some of which were found to contain fuels, solvents, pesticides, and lubricants) were removed. Approximately 850 cy of pesticide and diesel range organics (DRO) contaminated soil was removed and stockpiled for later use in a phytoremediation treatability study (see Sec. 4.3).

4.2.3 Remedy Selection

Nature of Contamination

Sampling conducted prior to and during the remedial investigation detected petroleum hydrocarbons, volatile organic compounds (VOCs), pesticides, and heavy metals in surface soil, subsurface soil, and groundwater; heavy metals in Chena River water samples; and VOCs, pesticides, and heavy metals in Chena River sediments. Of these, two organic compounds, two pesticides, and diesel range POL were reported in concentrations requiring remediation in the soil and groundwater at the site.

Preliminary data suggested that contaminant plumes in the groundwater were migrating from the known source areas; however, migration rates were undetermined due to the complexity of groundwater movement in the area. The results of the remedial investigation also suggested a high potential for the contaminants to migrate to the Chena River and affect downgradient groundwater users if not controlled.

Remedial Action Objectives

A baseline risk assessment indicated the need for remedial action at the 801 Drum Burial Site, and the following RAOs were established:

Groundwater

- Ensure that groundwater quality at the 801 Drum Burial Site meets federal and state standards.
- Minimize potential migration of contaminated groundwater to the Chena River and downgradient drinking water wells.
- Establish and maintain ICs to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies.

Soil

- Prevent further leaching of contaminants from soil to groundwater.
- Reduce risks associated with exposure to contaminated soil and drums.
- Prevent migration of soil contaminants to groundwater which could result in groundwater contamination and exceedances of federal MCLs and Alaska Water Quality Standards (AWQS) (18 Alaska Administrative Code [AAC] 70).

ARARs

The OU1 ROD cited the most significant ARARs for remedy selection at this source area to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- NCP off-site disposal rules. Applicable for disposal of drums and contaminated soil

Cleanup Goals

Cleanup goals were established in the ROD based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the source area.

Groundwater

Five chemicals of concern were established for groundwater in the ROD: aldrin, dieldrin, 1,1-dichloroethene (DCE), benzene, and vinyl chloride. When available, Federal and State of Alaska drinking water MCLs were adopted as the groundwater cleanup goals. At the time of the ROD, MCLs were available and used for 1,1-DCE, benzene, and vinyl chloride at the 801 Drum Burial Site; but there were no MCLs for aldrin or dieldrin. The cleanup levels for these two chemicals of concern were therefore based on risk-based concentrations equivalent to an excess lifetime cancer risks of 1x10-6 for residential exposure scenarios. However, since the ROD was finalized, groundwater cleanup levels for aldrin and dieldrin have been instituted. The MCLs for 1,1-DCE, benzene, and vinyl chloride have not changed, but the new MCLs for aldrin and dieldrin are an order of magnitude higher than the risk-based levels adopted in the ROD.

Soil

Two chemicals of concern were established for soils in the ROD: aldrin and dieldrin. Since there were no cleanup levels for either contaminant at the time of the ROD, soil cleanup goals for these chemicals of concern were established based on calculated excess lifetime cancer risks of 1×10^{-4} for a residential exposure scenario. In the time since the ROD was finalized, soil cleanup levels for aldrin and dieldrin have been established. The new cleanup levels for aldrin and dieldrin are lower than the risk-based levels adopted in the ROD.

Remedial action goals from the ROD and current MCLs for all chemicals of concern at the 801 Drum Burial Site are shown in Table 4-3.

Table 4-3. Remedial Action Goals for Chemicals of Concern at OU1

Media	Chemical of Concern	ROD Cleanup Level	Basis	Current Cleanup Levels[a]
Groundwater	Aldrin	0.004 µg/L	1×10^{-6} [b]	0.05 µg/L
	Dieldrin	0.004 µg/L	1×10^{-6} [b]	0.05 µg/L
	Benzene	5 µg/L	MCL	5 µg/L
	1-1-DCE	7 µg/L	MCL	7 µg/L
	Vinyl Chloride	2 µg/L	MCL	2 µg/L
Surface and Subsurface Soils	Aldrin	3.8 mg/kg	1×10^{-4} [c]	1.6 mg/kg
	Dieldrin	4.0 mg/kg	1×10^{-4} [c]	0.015 mg/kg

[a] MCLs from National Primary Drinking Water Regulations (NPDWR) and 18 AAC 75 Table C for groundwater; cleanup levels for migration-to-groundwater in the under 40-inch zone from 18 AAC 75 Table B1 for soils.
[b] Risk for groundwater based on Federal or State drinking water MCLs or an excess lifetime cancer risk of 1×10^{-6} for residential exposure scenario.
[c] Risk for soil is based on a residential exposure scenario of an excess lifetime cancer risk of 1×10^{-4}.
Notes: µg/L = micrograms per liter mg/kg = milligrams per kilogram

Selected Remedy

The remedy selected in the ROD for the 801 Drum Burial Site consisted of:

- Natural attenuation of groundwater with long-term groundwater monitoring/evaluation.

- Locating potential buried drums and, if found, removing and disposing of drums and contaminated soils, while restricting access to the source area during this work.
- Establishing and maintaining ICs to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies. ICs include restrictions governing site access, construction and well development or placement as long as hazardous substances remain on site that preclude unrestricted use.
- A groundwater contingent remedy which includes an air sparging / soil vapor extraction (AS/SVE) system to specifically treat VOCs. This remedy will be implemented if the plume shows an increasing trend over any three consecutive sampling events, or if designated monitoring points indicate the plume is migrating.

4.2.4 Status of Remediation

Drum and Soil Removal

Three separate removal actions for drums and soil were conducted between 1992 and 1996. These actions were conducted under the Army's removal authority and were documented in Decision Documents, which have been placed in the Administrative Record. A total of at least 244 drums have been removed from the site (an unknown number of drums were removed during initial construction), along with 850 cy of contaminated soil. Based on the geophysical surveys conducted at this source area in 1992, 1994, 1996, and 1997, and the subsequent removal actions, all drums are believed to have been removed from the site. The contaminated soil excavated from the site was used in a phytoremediation treatability study and was disposed into a lined cell in the Fort Wainwright landfill in 2003/04 (see Sec 4.3).

Groundwater Monitoring

Groundwater monitoring at this source area began after the signing of the ROD in September 1997 and is currently ongoing. The monitoring network included sixteen monitor wells constructed of 2-inch diameter PVC screened across the water table and varying in depth from 20 to 40 ft-bgs. Monitoring was initially done quarterly, for the first year, but the program has changed several times:

- In March 1998, the RPMs agreed that the groundwater monitoring frequency could be reduced from quarterly to annual sampling. This decision was based on results that demonstrated no new migration of contaminants and little or no change in contaminant concentrations at the wells. All 16 wells were sampled in March 1998.
- Based on the 1999 sampling results, the monitoring program was again modified: monitoring would still be done annually, but in odd-numbered years only two wells (AP-7163 and AP-7282) would be sampled for pesticides (limited sampling) and in even-numbered years all 16 wells would be sampled for pesticides and VOCs (comprehensive sampling).
- A comprehensive sampling effort was conducted in 2000. Based on the results, the monitoring program was reevaluated by the RPMs and the monitoring regime was again modified: the limited sampling program (two wells sampled for pesticides) would be conducted for two years (starting in spring 2001), then the comprehensive sampling (all 16 wells sampled for pesticides, gasoline range organics [GRO], DRO and metals) would be conducted every third year (starting in 2003). During the comprehensive sampling, eleven of the wells would also be sampled for VOCs.

- The monitoring program designed in 2000 was followed through 2004, with limited sampling (2 wells) in 2001, 2002, and 2004, and a comprehensive sampling in 2003.

In 2003 / 2004, a CLOSES evaluation was conducted at the site. This study consisted of an assessment of all monitoring and other data from the site, and provided recommendations for future monitoring strategies. This evaluation recommended the following changes to the monitoring program: Eight of the existing monitoring wells would be sampled every 5 years, with wells being sampled for various constituents (1 well for DRO / GRO; 3 wells for VOCs; and 7 wells for pesticides). The RPMs made the decision to adopt this monitoring program. However, because it was time for the Five-Year Review, the decision was made to sample all 16 wells for pesticides, GRO, DRO, and VOCs in 2005. After that, the recommendations of the CLOSES report would be followed, with the next monitoring effort to be conducted in 2010.

The most recent groundwater monitoring effort was conducted at the site in March 2005. All 16 existing wells were sampled. Samples from all 16 wells were analyzed for pesticides (both total and filtered), DRO, GRO, and metals. In addition, 11 of the well samples were analyzed for VOCs. Overall, the results indicated little change since the 2000 sampling effort. Dieldrin is the primary contaminant of concern at the site, with exceedences of the ROD risk-based cleanup level in 8 of the wells sampled. Two other contaminants, cis-1,2-DCE and benzene, were found above the MCLs in one well each, but the concentrations of both compounds has generally decreased from their 1997 levels. Cis-1.2-DCE is not a chemical of concern listed in the ROD for this site, but the EPA has formally requested that this compound be included in the list of compounds to track at the site (EPA Memorandum October 30, 2002). Target analyte concentrations at perimeter wells along the eastern, southern and western margins of the site either remained constant or were non-detect, indicating that contaminant migration is under control. Plate 4-1 summarizes the results of groundwater monitoring associated with this source area since 1997.

There were a few results of note from the 2005 sampling effort: first, aldrin, which is one of the chemicals of concern, was detected for the first time at the site; it was found in one well at a concentration below the ROD risk-based cleanup level. It may not have been found previously because detection limits were too high to detect the low levels that are present.

Another interesting result from the 2005 sampling effort was the results from the filtered pesticide samples. The rationale behind collecting filtered pesticide samples was to determine the form of the pesticide contamination in the groundwater, either in particulates or dissolved in the groundwater. The results showed there was very little difference between the total concentrations versus the filtered concentration, which indicates that the detected pesticides are actually dissolved in the groundwater. This is the opposite of the expected result because dieldrin has a very low solubility and would not typically dissolve in the groundwater, but would prefer to remain bound in the soils. While this result is unexpected, it does not change the monitoring rationale at the site.

Natural attenuation and long-term monitoring is the selected remedy at this source area, and as a result there is no system operations and maintenance *per se*. Monitoring wells are maintained as necessary, as is access to the wells. EPA has determined the remedy at the 801 Drum Burial Site to be operational and functional. An Operations, Maintenance and Monitoring (OM&M) Manual for the 801 Drum Burial Site, dated December 2000, provides specific procedures and protocol for ongoing maintenance and monitoring of the source area. The RPMs review the results of groundwater sampling and analysis as the data become available, and review the groundwater monitoring program for this OU on a regular basis.

Institutional Controls

ICs at the 801 Drum Burial Site source area have been implemented. An informational sign describing these ICs was posted at the source area in 2001 and repaired and updated in 2004-05. Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites.[1] This policy was last updated in 2001, but it is currently under review and a new update is expected in 2006. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a Geographic Information System (GIS) database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental. There have been no unauthorized activities at this site, and the ICs are accomplishing the intended purpose.

Since there is no surface contamination at the 801 Drum Burial Site, access to the area for non-intrusive activities is unrestricted. Plate 1-I depicts the boundary of the area in which intrusive activities are restricted.

Contingent Remedy

Based on groundwater monitoring results to date, the drum and contaminated soil removals appear to have successfully controlled what had been an ongoing source of groundwater contamination. As a result, it has not been necessary to implement the contingent remedy, and AS/SVE is not anticipated at this time.

Site Inspection

The 801 Drum Burial Site was inspected on June 6, 2006. All wells appeared to be in good condition at that time. The community information sign was also in good condition, and no unusual conditions were observed.

4.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

The selected remedies for the 801 Drum Burial Site are operating as intended. Monitoring results to date at the 801 Drum Burial Site indicates that there have been no significant changes in contaminant concentration, which demonstrates that the removal actions have effectively removed the contaminant sources (drums and contaminated soils). Although aldrin was detected in groundwater for the first time in 2005, the levels were well below the RAGs and it

[1] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

was likely detected due to improved detection limits rather than an increase in the concentration. Other chemicals of concern also showed no increases in concentrations during the monitoring program that would suggest on-going sources contributing to the contamination.

Concentrations of volatile organic compounds and pesticides in the identified plume are generally stable with some minor variation over the monitoring period. Groundwater monitoring results indicate that the identified plume has not migrated from the source area and that the concentrations reported in the 2005 sampling results indicate no significant changes in concentrations for the pesticide and VOC analytes. Dieldrin and benzene are the only chemicals of concern that remain above the RAGs, although cis-1,2-DCE also exceeds the RAGs in one well. ICs are in effect and will continue to restrict groundwater use.

The most recent monitoring data for the 801 Drum Burial Site was collected in March of 2005 at all 16 existing wells. Dieldrin exceeded the ROD risk-based cleanup level in 8 wells, while benzene and cis-1,2-DCE exceeded their MCLs in one well each. Table 4-4 summarizes performance to date related to the RAOs for this source area.

Table 4-4. Performance to Date of Remedial Action Objectives at OU1

Remedial Action Objectives	Performance to Date
Ensure that groundwater at the 801 Drum Burial Site meets federal and State standards.	The contaminants dieldrin, benzene, and cis-1,2-DCE remain above the ROD cleanup levels in groundwater.
Minimize potential migration of contaminated groundwater to the Chena River and downgradient drinking water wells.	Perimeter wells indicate no migration of contaminants from the source area to the Chena River or to the 801 housing area. Monitoring records indicate stable concentrations of contaminants with little variation over the past 9 years.
Establish and maintain ICs to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in the ROD. ICs include restrictions governing source area access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the ICs in place at this source area because noncompliance will violate a requirement of the ROD and therefore violate the Fort Wainwright Federal Facility Agreement between the Army, U.S. EPA, and ADEC.	ICs are in place per APVR-RPW (200-1) and APVR-RPW-EV-(200-1c) and are effectively controlling exposure pathways that could result in unacceptable risk.
Prevent further leaching of contaminants from soil to groundwater.	Removal of drums and pesticide contaminated soil were effective in removing the source, thereby preventing further leaching of contaminants to groundwater.
Reduce risk associated with exposure to contaminated soil and drums.	Removal of drums and contaminated soil has reduced this risk.
Prevent migration of soil contaminants to groundwater, which could result in groundwater contamination and exceedances of state and federal MCLs and AWQS.	Removal of drums and pesticide contaminated soil are believed to have been effective in removing the source and preventing further leaching of contaminants to groundwater. Ultimate effectiveness to be measured by achieving groundwater RAOs.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The assumption that contamination in soil will not leach further into the groundwater appears to be valid based on groundwater monitoring results to date (ENSR, 2005).
- The assumption that the groundwater contamination will not migrate off of the site is validated by the evaluations done in the CLOSES report (CH2M Hill 2004) and the groundwater monitoring results to date (ENSR, 2005).
- The assumption that the contamination will naturally attenuate is still valid, although the attenuation rate is very slow and the point in time when groundwater cleanup goals will be achieved has not been estimated.
- The ICs currently in place are effectively restricting exposure to groundwater.
- There are no known changes in exposure pathways or populations at risk.
- There have been no changes in the MCLs for 1,1-DCE, benzene, or vinyl chloride.
- The State of Alaska has established groundwater and soil cleanup goals for aldrin and dieldrin since the 2001 Five-Year Review was finalized.
- Risk factors, associated with aldrin and dieldrin, have not changed since the ROD.[2]

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances from the ROD

The following variances have been found since the 2001 Five-Year Review was conducted:

Table 4-5. Variances from the ROD since 2001 at OU1

Variances	Currently Affects Protectiveness (Yes/No)
The State of Alaska has established Method 2 soil cleanup levels for aldrin and dieldrin.	No
The State of Alaska has established groundwater cleanup levels for aldrin and dieldrin	No

[2] A review of these chemicals in the EPA Integrated Risk Information System (IRIS) (www.epa.gov/IRIS/index.html) shows that there have been no significant revisions to their status since 1991.

Recommendations

Although the State of Alaska has established soil and groundwater cleanup goals for aldrin and dieldrin, there are still no federal MCLs for these chemicals. Because the risk-based levels established in the ROD are lower than the new State of Alaska MCLs, the risk-based levels are still considered protective and there is no reason to change to ROD to adopt the State MCLs. There are no recommendations or follow-up actions for the 801 Drum Burial Site at this time.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 4-6.

Table 4-6. Response to Recommendations from 2001 Five-Year Review

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Redraw IC boundaries to more closely coincide with the contaminated area	ICs for Fort Wainwright were revised in 2002; the newly established IC boundary for this site is shown in Plate 1-I	U.S. Army	2002	No

4.3 Phytoremediation Treatability Study Soils

During the removal actions that took place at the 801 Drum Burial Site in 1996, approximately 850 cy of pesticide and DRO contaminated soil was removed and stockpiled. This soil was used in a treatability study to determine if phytoremediation may be a viable method for remediating pesticide contaminated soils. The soil was relocated to the south side of River Road, across from the landfill, for the treatability study.

4.3.1 Treatability Studies

A treatability study was designed and implemented to evaluate the performance of phytoremediation for reducing concentrations of pesticides (aldrin and dieldrin) in the soil removed from the 801 Drum Burial Site. Five treatment cells were constructed for the study. Several vegetation types were evaluated and both drained and saturated conditions were maintained. After 4 years of monitoring, overall results showed that the aldrin concentrations decreased significantly whereas dieldrin concentrations increased slightly. Results varied due to sample variability and different conditions. For example, in saturated (slightly anaerobic) conditions, dieldrin decreased significantly and aldrin decreased only slightly. The full study results can be found in the various Rhizosphere-Enhanced Phytoremediation Study Annual Progress Reports (ENSR, 1998, 1999, 2000, and 2001).

Additional studies were conducted by University of Alaska Fairbanks and Anchorage to evaluate the rhizosphere-enhancements, vegetation variations, chemical movement with radio-labeled compounds, and leachability of the chemicals.

4.3.2 Regulatory Status

While the soil used in the treatability study was still considered part of the CERCLA action for Fort Wainwright, it was no longer associated with OU1 for regulatory or management purposes. At the conclusion of the study, questions were raised regarding the disposition of the soils and disposal options. In a memorandum to the Army dated July 26, 2000, EPA addressed these questions. Most importantly, they concurred with the Army's conclusion that the soil was not a RCRA regulated hazardous waste. Once this determination had been made, several disposal options were available including: placing them into the Fort Wainwright Landfill; or, shipping them off-site and/or out of state for disposal in an appropriate facility.

4.3.3 Decommissioning and Soil Disposal

The Army decided that the most cost-effective alternative was to dispose of the treatability study soils at the Fort Wainwright Landfill. Plans were drawn for a specially designed containment cell that would be constructed in the landfill for disposal of the soils. The cell would be lined, capped, and sealed, in compliance with the State of Alaska Solid Waste Permit. The plans for the cell were approved by the ADEC. In 2003 and 2004, the cell was constructed in the landfill, the treatability study components were decommissioned, and the soils were transferred to the cell.

Confirmatory soil samples were collected from the area beneath the former study cells to confirm that no pesticides had contaminated the underlying soils. Dieldrin was detected in these soils at levels exceeding the Method 2 migration-to-groundwater cleanup levels. Based on these results, an additional 130 cy of soil were scraped to a depth of 12 to 18 inches from the former study site and placed into the containment cell. A second round of soil samples confirmed that the contaminated soils had been successfully removed and that the site was clean. The containment cell membrane was chemically sealed and capped with impermeable soils.

A report was prepared to document the decommissioning activities, including the construction of the storage cell within the landfill, the collection of confirmatory samples, and the restoration of the study site to its previous condition. This report was found to be acceptable by the ADEC and was finalized in September 2005.

In 2005, during an inspection of the cell, the soil cap was observed to have collapsed in two small areas (approximately 1 foot in diameter). The cell cap membrane could be seen in these two holes and appeared to be ballooning, apparently as a result of off-gassing due to microbial activity within the soils. In response to this, the Army has installed six vent wells that are able to vent any gases that build up within the cell. These vents are sealed to the cell cap membrane in order to maintain the integrity of the cell. They are being monitored on a regular basis.

5 OPERABLE UNIT 2

5.1 OU2 Background

Operable Unit 2 (OU2) originally consisted of the following eight source areas: the North Post Site, the 801 Drum Burial Site, the Engineers Park Drum Site, the Drum Site South of the Landfill, Building 3477, four Tar Sites, the Defense Reutilization and Marketing Office (DRMO) Yard, and the Building 1168 Leach Well. All OU2 source areas underwent PSEs, which included historical record reviews and, as necessary, limited field investigations. Subsequent IRP management of these source areas was based on the results of the RI as follows:

- The 801 Drum Burial Site, Engineers Park Drum Site and the Drum Site South of the Landfill were addressed by the OU1 ROD.
- North Post Site was addressed under the 2-PTY.
- Building 3477 and the Tar Sites were assigned NFA status.
- Building 1168 Leach Well and the DRMO Yard are the only two source areas recommended for further action under OU2, based on potential risk to human health and the environment (see Figure 5-1).

The list of OU2 source areas and their status is shown in Appendix F.

5.2 Building 1168 Leach Well

5.2.1 Overview

Building 1168 (Figure 5-2) was constructed in 1950 as a lubricant oil and vehicle storage facility and was converted to a POL laboratory around 1962. It is located near the western boundary of Fort Wainwright, adjacent to Trainor Gate Road. The primary source of contamination was from a former leach well connected to an oil/water separator system. Contaminants found at this site included POL, solvents and heavy metals. The decision to treat this source was influenced by its proximity to the Post boundary (500 feet) and a public school (1,000 feet). Remedial action was undertaken *for in-situ* treatment of contamination. Installation of the AS/SVE system was completed in November 1994[1], and active AS/SVE operations continued through 1998. The system was turned off after RAOs for non-POL contaminants were achieved and the AS/SVE system was decommissioned in 2003. Groundwater monitoring has indicated that some limited contaminant rebound has occurred in a single monitoring well.

[1] The Army has designated construction of this remedial action as complete for project tracking and accounting purposes.

5.2.2 Background

Periods of use and dates related to the history of Building 1168 contamination and remediation are shown in Table 5-1.

Table 5-1. History of Regulatory Events at OU2 Building 1168[a]

Event	Date
Lube oil and vehicle storage facility operations	1949 to 1962
Converted into a petroleum test laboratory	1962
Groundwater survey conducted and EPA recommends further investigation	1990
Fort Wainwright listed on NPL	August 1990
FFA signed	1992
2-PTY signed	1992
PSE conducted	1992 and 1993
RI conducted	1994
Source area pilot-scale AS/SVE remediation system installed	November 1994
FS completed	1996
ROD signed	January 1997
Building 1168 Demolished	1997
Active AS/SVE treatment completed	1998
RAR completed	May 1999
Final OM&M issued	December 2000
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete concurrence received from the EPA	2002
AS/SVE System decommissioned	2003

[a]Information obtained from the OU2 ROD, Building 1168 RAR, Building 1168 OM&M Manual, and the Five-Year Review Report Document Log.

Physical Characteristics

The Building 1168 source area is within the main post confines and located north of Trainor Gate Road, adjacent to the Trainor gate entrance. At the time of this document, a post housing project is under construction immediately to the north and east of the site. Trainor Gate Road is located along the southern edge of the site. A Fairbanks public school is within 1,000 feet northwest of this site, and the 801 military housing area is approximately 300 feet south of the site. The nearest surface water body, the Chena River, is approximately 1,800 feet to the east. No surface water drainage pathways are evident. No endangered or threatened species reside in the area.

Subsurface soil at this site consists of unconsolidated lenses of interlayered silt, silty sand and poorly graded sand and gravel. Predominant groundwater flow is generally to the west-northwest following the trend of the Tanana River Valley, however seasonal changes in flow direction may occur due to the influences of water level changes in the Chena River located approximately 1,800 feet to the east and south.

Land and Resource Use

Building 1168 was demolished during the summer of 1997, and the former building site is now a flat, graded gravel lot. A housing project is currently under construction in the area to the north and east of this site. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

History of Contamination

Contamination at Building 1168 originated from a leach well that received liquids collected in floor drains within Building 1168. From the 1950s to 1997, Building 1168 was used as a lubrication oil and vehicle storage/shop facility, and a POL laboratory. Floor drains in the building formerly discharged into an oil/water separator designed to allow POL to flow into a storage tank and wastewater to flow through a 4-inch diameter buried waste line to a leach well approximately 100 feet southwest of the former building. The oil/water separator system was decommissioned in 1993. Because of system malfunctions during the 40 years of service, some products entering the oil/water separator were inadvertently conveyed directly to the leach well, subsurface soil, and groundwater. Products suspected to have entered the leach well include oil from engines and transmissions, gasoline, diesel, jet fuel, and solvents.

Pre-ROD Response

The initial response to contamination identification at Building 1168 Leach Well was to install a treatability study AS/SVE system in 1994.

5.2.3 Remedy Selection

Nature of Contamination

Contaminated soils associated with the leach well appears to be the source of contamination detected in the groundwater which is located approximately 12 to 17 ft-bgs. Initial site investigations discovered a zone of hydrocarbon contamination approximately four to five feet thick in subsurface soils near the groundwater interface and extending approximately 50 feet radially from the leach well. Contamination from these subsurface soils created commingling benzene and trichloroethene (TCE) plumes in the groundwater 20 to 50 ft-bgs. Initial chemicals of concern for remediation at this site included the following:

Groundwater

- RI results confirmed the presence of VOCs, benzene, TCE, vinyl chloride, 1,1-DCE, and cis-1,2-DCE in groundwater above MCLs.

Soil

- Subsurface soils were found to contain DRO, GRO and benzene, toluene, ethylbenzene, and xylenes (BTEX). The release mechanism precluded significant surface contamination at this site.

Remedial Action Objectives

RAOs for the Building 1168 Leach Well source area and the DRMO Yard are identical and were based on federal and state ARARs. All groundwater RAOs were based on state and federal MCLs. Soil RAOs were based on State of Alaska cleanup levels for non-UST petroleum contamination.

The RAOs for groundwater at all OU2 source areas are:

- Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame through source control
- Reduce or prevent further migration of contaminated groundwater from the source areas
- Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act and State of Alaska Drinking Water Standard MCLs and Alaska Water Quality Standards
- Use natural attenuation to attain Alaska Water Quality Standards (18 AAC 70) after reaching state and federal MCLs

The RAO for soil at all OU2 source area is:

- Prevent migration of soil contaminants to groundwater, which could result in groundwater contamination and exceedances of state and federal MCLs and Alaska Water Quality Standards (18 AAC 70)

ARARs

The OU2 ROD cited the most significant ARARs for remedy selection at this site to be:

- State and Federal MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution Regulations – Applicable
- Alaska Guidelines for Non-UST Petroleum Contaminated Soil – To be considered

Cleanup Goals

Groundwater

Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, TCE, vinyl chloride, 1,1-DCE, and cis-1,2-DCE at the Building 1168 Leach Well source area.

Soil

The ROD stated that "because soils contaminated with VOCs and petroleum-related compounds are acting as a continuing source of contamination to groundwater, the remedial action goal for *in-situ* soils is active remediation until contamination levels in groundwater are consistently below state and federal MCLs." The State of Alaska cleanup levels for non-UST petroleum-contaminated soil will be considered as a guideline for the treatment of *in-situ* soils at the Building 1168 Leach Well source area. Table 7-2 of the ROD adopted ADEC soil cleanup matrix Level A cleanup goals for DRO, GRO, benzene, and (total) BTEX at this source area.

Numeric values for the cleanup goals established in the RODs are summarized in Appendix B.

Selected Remedy

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water aquifer and to remediate soil to State of Alaska cleanup levels for non-UST petroleum-contaminated soil. To achieve the OU2 ROD objectives, the remedial action components specified for the Building 1168 Leach Well Source Area included:

Soil Vapor Extraction and Air Sparging

- *In-situ* treatment of groundwater via air sparging to remove volatile organic compounds, thereby attaining state and federal drinking water standards.
- *In-situ* treatment of soil via soil vapor extraction to prevent contaminated soil from acting as an ongoing source of contamination to groundwater.
- Treatment system evaluation and modification as necessary to optimize effectiveness.
- Periodic monitoring and evaluation of air emissions from the soil vapor extraction/air sparging treatment system to meet air emission requirements.
- Periodic groundwater monitoring and off-gas measurements to determine attainment of RAOs.

Natural Attenuation and Groundwater Monitoring

- Achieve Alaska Water Quality Standards through natural attenuation after active treatment attains state and federal maximum contaminant levels.

Institutional Controls

- Maintain ICs, including restricted access and well development restrictions, as long as hazardous substances remain on site at levels that preclude unrestricted use.

5.2.4 Status of Remediation

Leach Well

In 1994, a pilot scale remediation system was installed around the leach well to determine whether an *in-situ* treatment system was technically feasible in source area soil and groundwater. The system was modified and expanded in 1996 and 1997 to optimize the effectiveness based on monitoring data evaluation. The treatment system was designed to operate in the summer months (May through October) only, and operated seasonally until December 1998 when the system was shut down following achievement of the remedial action objectives.

Groundwater Monitoring

Groundwater monitoring frequency was decreased from quarterly to annually following attainment of MCLs and system shut-down in 1998. However, some minor rebound in concentrations of contaminants has occurred since the treatment system was shut down, and, following review by the RPMs, groundwater monitoring frequency was increased to a semiannual basis subject to reconsideration after the May 2002 sampling event.

In general, sample results indicate that groundwater contamination at the site has decreased since 1994. This has been attributed mainly to the operation of the treatment system from 1994 to 1998. Plate 5-I summarizes the available results of source area groundwater monitoring data from 1994 to 2005 (see appendices section of report).

- GRO has not exceeded the groundwater cleanup levels since June 1998 and TCE has not exceeded the MCL since October of 1997.
- Benzene has rebounded at well PS-23 since the discontinuation of active treatment. Benzene concentrations were detected at concentrations of 23.7 µg/L at PS-23 in 2004. Sampling results from 2005 detected benzene at 13.8 and 7.67 µg/L. Benzene levels have been reduced by two orders of magnitude from initial sampling results; however levels have sporadically exceeded the cleanup goals since September 2001. Benzene levels have remained slightly below the cleanup levels in wells AP-5751 and AP-6809.
- DRO levels dropped significantly in wells GP1 and GP2 at the onset of treatment while PS-23 exhibited a slight trend toward decreasing concentrations. Concentrations at all three locations were below ADEC Groundwater Cleanup Standards at the January 1998 sampling event. Following discontinuation of active treatment, DRO levels have rebounded above the cleanup goal in three wells, AP-5751, PS-23, and AP-6809 during 2005 sampling. The highest DRO concentrations during 2005 were detected in AP-5751 at 18,000 µg/L during the January sampling event and 5,140 µg/L in the October sampling event.

The Building 1168 site is located near the western boundary of Fort Wainwright and is monitored by picket wells along the boundary line. No contamination has been detected in any of these wells above the MCLs.

Institutional Controls

Fort Wainwright has established a post wide IC policy for all known or suspected contaminated sites.[2] This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

---

[2] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

USAG-AK DPW *maintains a GIS database with information on all of the contaminated sites on* post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Plate 1-I depicts the Building 1168 area subject to restricted use under the IC policy.

Site Inspection

This site was visited during the 2006 site inspection and all wells were found to be in good condition with the exception of PS-23 which could not be located. This flush-mount well is located in an area that now serves as a parking lot for the Sitku Basin housing construction project. Discussions with the Contractor that currently manages the site indicated that the well is likely just buried under a few inches of gravel.

5.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Remedial Action Performance

The selected remedies for Building 1168 are operating as intended. The remediation goals were met using AS/SVE in the contaminated area. The system was removed in 2003. Groundwater monitoring results indicate that the identified plume has not migrated from the site area.

Sampling indicates that benzene has rebounded just above the MCLs in well PS-23, but remains below MCLs in wells AP-5751 and AP-6809. DRO concentrations remain above State of Alaska water quality standards and are being assessed for natural attenuation through evaluation of field parameters and monitoring results. Contamination has not been detected above MCLs in the picket wells along the post boundary line. Current contaminant levels do not warrant re-installation of the treatment system.

Plate 5-I summarizes the results of groundwater monitoring associated with this source area.

Implementation of Institutional Controls

ICs are in effect and will continue to restrict groundwater usage.

System Operations/O&M

The AS/SVE treatment system was decommissioned in 2003. Groundwater monitoring will continue on a semiannual basis until sampling and analysis further confirms benzene to have stabilized at a concentration below the MCL.

Table 5-2 summarizes performance to date related to the RAOs for this source area.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The assumption that the groundwater contamination will not migrate off of the site is validated by the groundwater monitoring results on site and at the boundary picket wells.

- Despite the relatively limited rebound in benzene, the assumption that the contamination will naturally attenuate is still correct, however the degradation rate for DRO is slow and can not be accurately estimated from the groundwater monitoring results at this time. ICs are in effect and will continue to restrict groundwater usage.
- There are no known changes in exposure pathways or populations at risk.
- The MCLs used to establish the groundwater cleanup goals for the Building 1168 Leach Well source area have not changed since the ROD.

Table 5-2. Performance to Date of Remedial Action Objectives at OU2 Building 1168

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame through source control	Treatment initially reduced contaminant concentrations below MCLs, however a slight rebound in the benzene concentration in one well has occurred. DRO remains above the ADEC 18 AAC 75 groundwater cleanup level.
Reduce or prevent further migration of contaminated groundwater from the source areas	Little or no migration of contaminants from the source area to groundwater is occurring based on results from the groundwater monitoring program.
Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act and State of Alaska Drinking Water Standard MCLs and AWQS	ICs are in effect to restrict groundwater use.
Use natural attenuation to attain AWQS (18 AAC 70) after reaching state and federal MCLs	Natural attenuation is the primary remedial action since discontinuing the AS/SVE system operation.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 5-3. Data from the groundwater monitoring program continues to be evaluated as it is reported to assure no off-site migration of contaminants and to evaluate progress of natural attenuation.

Recommendations and Follow-up Actions

Data collected from the groundwater monitoring program should continue to ensure that no-off site migration of contaminants is occurring. Monitoring should also continue to ensure that natural attenuation processes are treating residual contamination in the groundwater.

Table 5-3. Response to Recommendations from 2001 Five-Year Review

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Redraw the IC boundary around the entire source area (CERCLA and 2-PTY)	The IC boundary was changed to encompass the area of potential exposure to both Leach Well and 2-PTY site contamination	U.S. Army	2002	No

5.3 OU2 – DRMO Yard

5.3.1 Overview

Contamination was originally identified at six sub-areas at the DRMO yard (Figure 5-3). Two sub-areas with petroleum and solvent contamination are part of OU2, and the others are addressed in the 2-PTY or were identified in the ROD as requiring NFA. Contaminants found at the DRMO Yard were solvents and petroleum in the soil and groundwater. The site is located along Badger Road, northwest of the intersection of Badger Road and the Old Richardson Highway, on the eastern boundary of Fort Wainwright. The salvage yard is located within a fenced compound covering approximately 25 acres. Spills occurred routinely at the DRMO Yard in the past. The RI/FS was completed in October 1994. The ROD was signed in April 1997, with the chosen alternative being air sparging/soil vapor extraction with groundwater monitoring. The AS/SVE system was installed during the summer of 1997, and new groundwater monitoring wells were installed outside the northwest fence line at Building 5010, and inside the south fence line. The monitoring wells outside the northwest fence line are picket wells to provide information related to off-site migration of contaminants from this source area towards Channel B, a man made trench constructed as part of the Chena River flood control project.

5.3.2 Background

The DRMO Yard source area was divided into six sub-areas for remedial investigation purposes. Of these six sub-areas, three (DRMO-2, DRMO-3, and DRMO-5) were found to have petroleum-related contamination without commingling with other contaminants of concern. These sites are addressed under the 2-PTY. Contamination in another of the sub-areas (DRMO-6) was determined to warrant no further action. Two of the sub-areas (DRMO-1 and DRMO-4) were carried through to remedial action under CERCLA.

Three remediation systems were installed and operated at the DRMO Yard: 1) the DRMO-1 design study treatment system for petroleum contamination; 2) the DRMO-5 design study treatment system, also for petroleum contamination; and 3) the OU2 ROD design study treatment system. The OU2 ROD treatment system located in DRMO-1 is being operated under CERCLA; the DRMO-1 and DRMO-5 treatment systems are being conducted under the 2-PTY and will not be discussed further in this section. All of the systems are currently shut down and the sites are undergoing contaminant rebound studies.

Periods of use and dates related to the history of DRMO Yard contamination and remediation are shown in Table 5-4.

Physical Characteristics

The DRMO Yard is an approximately 25 acre, fenced compound located near the eastern end of the post on the west side of Badger Road. The yard is bordered by the Alaska Railroad tracks on the south and a channel of the Chena River Flood Control Project on the west. No endangered or threatened species reside in the area.

Groundwater flow is generally toward the west following the regional flow of the Tanana River Valley. At the western boundary of the DRMO Yard there may be some minor short term influences due to water level fluctuations in the man made channel (Channel B).

Table 5-4. History of Regulatory Events at OU2 DRMO Yard[a]

Event	Date
Vehicle storage and vehicle maintenance shop activities	1945 to 1961
Site converted to salvage yard and drum storage	1961
Diesel spill near Building 5001	Early 80s
Removal of eight USTs (cleanup of associated soils are being addressed under the 2-PTY)	1988 to 1996
FFA signed	1992
2-PTY signed	1992
Installation and semiannual sampling of 14 monitoring wells at the DRMO yard as part of the Arctic Surplus site investigation	1990 to 1993
Fort Wainwright listed on NPL	August 1990
Soil and groundwater contamination discovered north of Building 5001 during investigation for construction of a building foundation	July 1992
PSE2, Phase 2, conducted at DRMO yard to assess extent of soil contamination	September 1992
Proposed Plan for Remediation made available to public	April 1996
OU2 RI and FS issued	1996
AS/SVE systems installed at sub-areas DRMO-1 and DRMO-5 as part of a petroleum hydrocarbon treatability study (performed under the 2-PTY)	Summer of 1996
OU2 Record of Decision signed	January 1997
ROD Design Study System in sub-area DRMO-1 is commissioned.	July 1997
OU2 RAR completed	August 1999
Final DRMO OM&M issued	December 2000
Final OU2 Design Study System OM&M issued	June 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete concurrence received from the EPA	2002
CLOSES Evaluation of DRMO Yard	March 2004
DRMO-1 Three-Party treatment system is shut down for contaminant rebound evaluation	November 2005

[a] Information obtained from OU2 ROD; August 1999 OU2 RAR; 1999 Monitoring Report, North Post, DRMO-1, and DRMO-5 Sites; Draft Comprehensive Annual Monitoring Report (February 2000); and the Five-Year Review Report Document Log.

Land and Resource Use

The DRMO Yard's function is to store obsolete, surplus, unserviceable equipment and supplies for transfer to another authorized user, for public auctions, or for destruction and disposal. The yard has contained numerous aisles of surplus appliances, tires, transformers, and wire. Additionally, it formerly served as the hazardous material transfer point for Fort Wainwright, Fort Greely, and Eielson Air Force Base and operates as a storage facility in accordance with the Fort Wainwright RCRA Part B Permit. The land use is currently designated "industrial" and is expected to retain that designation for the foreseeable future.

Two residential areas are located near the DRMO Yard. The first is approximately 1,400 feet to the north and the second is approximately 1,000 feet to the northeast, both subdivisions use groundwater as their drinking water source and their wells are located in the same unconfined aquifer as that associated with the DRMO Yard groundwater contamination. Groundwater in the area generally flows west to northwest, away from these residential areas; however, fluctuations in flow direction occur.

A Class C public drinking water well and fire suppression system exist on site, but their use has been restricted by ICs enacted under a State of Alaska Plan Approval to Construct. The ROD specified that, with the exception of emergencies, the fire suppression water tank not be refilled from the DRMO Yard water supply well until after MCLs are met. Groundwater use is considered to be residential.

History of Contamination

From 1945 to 1961, the DRMO Yard was used for vehicle storage and contained a vehicle maintenance shop. In 1961 the source area was converted into a salvage yard and was used to store drums of waste oil; pesticides; solvents; vehicle fluids such as antifreeze and hydraulic fluid; asphalt; and electrical transformers, some of which may have contained polychlorinated biphenyls (PCBs). Many drums reportedly leaked. Items such as mattresses, wood furniture and possibly plastics were incinerated routinely in a burn pit and it is likely that the drummed fluids were also disposed of by burning. Waste oil, which historically contained heavy metals, solvents, PCBs, and other contaminants, was used to control dust on roads in the DRMO Yard during the 1970s and early 1980s.

During the early 1980s, an estimated 3,000 gallons to 8,000 gallons of No. 1 diesel fuel were spilled near the former location of Building 5001. Cleanup activities of that spill included spreading the contaminated soil throughout the yard. Storage and destruction records were maintained by DRMO Yard personnel for three years and then were destroyed. Complete records of DRMO Yard activities are therefore unavailable.

Pre-ROD Response

From 1988 to 1996, eight leaking underground petroleum storage tanks, ranging in size from 500 gallons to 10,000 gallons were removed from the DRMO Yard. Cleanup of the associated petroleum-contaminated soil and groundwater is being conducted under the 2-PTY.

5.3.3 Remedy Selection

Nature of Contamination

DRMO-1 (OU2 Three-Party Treatment System)

The DRMO-1 sub-area was the site of waste oil drum and transformer storage, but no discrete source was identified for the perchloroethylene (PCE), TCE, DRO, and GRO contamination at this location. A well defined plume of groundwater contaminated with PCE and TCE was delineated at DRMO-1 during 1995 RI activities.

In addition to the above contaminants, 1,1-DCE and cis-1,2-DCE are known breakdown products of PCE and TCE. Although not detected during the RI, these compounds were considered to be contaminants of potential concern in formulating the RAOs for the DRMO Yard. The location of the PCE or TCE release has been determined to be within the treatment area.

DRMO-4

Benzene and PCE contamination at the DRMO-4 source area appears to have resulted from miscellaneous releases associated with activities occurring along a railroad spur, resulting in a smaller groundwater contamination plume and lower contaminant concentrations than was evidenced in DRMO-1.

Remedial Action Objectives

RAOs for the DRMO Yard and the Building 1168 Leach Well source area are identical and were described in Section 5.2.3.

ARARs

ARARs for the DRMO Yard and the Building 1168 Leach Well source area are identical and were described in Section 5.2.3.

Cleanup Goals

Groundwater

Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, PCE, TCE, vinyl chloride, 1,1-DCE, and cis-1,2-DCE at the DRMO Yard source area.

Soil

ADEC soil cleanup matrix cleanup levels were adopted as preliminary remediation goals for DRO in the DRMO Yard source area.

Numeric values for the cleanup goals established in the RODs are summarized in Appendix B.

Selected Remedy

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water aquifer and to remediate soil to State of Alaska cleanup levels for non-UST petroleum-contaminated soil. To achieve the OU2 ROD objectives, the remedial action components specified for the DRMO source area included:

Soil Vapor Extraction and Air Sparging

- *In-situ* treatment of groundwater via AS to remove volatile organic compounds, thereby attaining RAOs
- *In-situ* treatment of soil via SVE to prevent contaminated soil from acting as an ongoing source of contamination to groundwater
- Treatment system evaluation and modification as necessary to optimize effectiveness
- Periodic monitoring and evaluation of air emissions from the soil vapor AS/SVE treatment system to meet air emission requirements
- Periodic groundwater monitoring and off-gas measurements to determine attainment of RAOs
- Natural Attenuation and Groundwater Monitoring
- Achieve AWQS through natural attenuation after active treatment attains state and federal maximum contaminant levels

Institutional Controls

Maintain ICs, including restricted access, well development restrictions and prohibition against refilling fire suppression water tank from the on-site well, as long as hazardous substances remain on site at levels that preclude unrestricted use.

5.3.4 Status of Remediation

DRMO Yard

The OU2 AS/SVE Treatment System was installed at the DRMO-1 source area in the summer of 1997. The system is composed of a blower enclosure, 4 manifold boxes, and a well field. The AS and SVE blowers, electrical components, and soil gas vapor treatment equipment are housed in the enclosure. The AS well field consists of 52 AS probes with screens 2 feet in length at an approximate depth of 32.5 ft-bgs. The SVE collection is through 16 horizontal screens, each 10 feet in length and buried to a depth of 5 ft-bgs within the AS well field.

This AS/SVE system was initially bisected by a soil stockpile. The stockpile was suspected of contributing to groundwater contamination, potentially limiting the effectiveness of remediation. After removal of the stockpile, a monitoring well was installed at that location. Sampling results for this well indicated that the AS/SVE system was effectively covering the contaminated area. The AS/SVE system was designed to operate only in the summer months (May through October) and operated seasonally from 1997 to 2005, although the AS system was operated continuously during recent years. In 2005, the sparge wells were hydro-shocked[3] to help improve air flow through the soil.

[3] Over time, air sparge probes often become blocked by iron precipitation and/or silt encrustation of the probe screen. This limits the amount of air-flow moving through the probe, which in turn decreases the effectiveness of the AS/SVE system. "Hydro-shocking" is a method that was developed for rehabilitation of air sparge wells. This technique uses a tool that discharges a powder charge cartridge below the water table inside the probe. This creates a shock wave that breaks up the encrustation, ultimately clearing the probe screen. This method has been successfully used to rejuvenate over 1,000 sparge probes at various OUs and 2-PTY sites on Fort Wainwright.

Long term monitoring is being conducted at DRMO-4. In 2002, several groundwater probes were installed downgradient of the DRMO-4 source to further delineate groundwater contamination.

Groundwater Monitoring

DRMO-1 (OU2 Three-Party Treatment System)

Groundwater monitoring at DRMO-1 is performed on a semiannual basis. The groundwater monitoring component includes sampling and analysis of the seven OU2 Treatment System wells located in and adjacent to the DRMO Yard. DRMO picket wells located along the northwest boundary of the yard have also been used to evaluate potential downgradient migration of the PCE/TCE plume.

PCE and TCE have been detected consistently in five of the wells in the DRMO-1 sub-area. Four of the five wells located within the predicted PCE/TCE plume have seen significant decreases in PCE levels since initiation of the OU2 treatment system. The PCE concentration in well AP-6803, located in the main OU2 Treatment System field, has decreased by an order of magnitude since 1995 but rebounded slightly in 2000. In 2003, well AP-6803 became unusable and was replaced with monitoring well AP-8914. PCE in well AP-8914 has remained above the RAO. PCE and TCE concentrations in wells AP-7559, AP-6804, AP-7560 and AP-6807 are below the RAOs. TCE is below the RAOs in AP-8914. The overall decrease in contaminant levels seen in the area of the predicted plume is attributed to the operation of the OU2 treatment system.

PCE concentrations have remained above the RAOs in well AP-8914 with observed PCE concentrations between 21 and 58 μg/L. TCE concentrations have been consistently below the MCL.

PCE and TCE concentrations in the picket wells have consistently been below the RAOs. DRO levels have fluctuated at the site with AP-7550 reporting levels between 300 to 10,300 mg/L.

DRMO-4

PCE concentrations continue to be above the RAO in several wells or probes in the DRMO-4. PO5 has had PCE values ranging from 12 and 22.9 μg/L. AP-8916 has had PCE values reported from 8.03 to 25 μg/L. PO5 also had TCE reported at 5.5 μg/L in 2002.

Plate 5-II provides an overview of groundwater monitoring results from the DRMO Yard.

Institutional Controls

Access to the site is restricted by a chain-link fence. In 2005, an additional chain-link fence was installed that separates the treatment areas from the storage areas at the DRMO-1 area. Controlled access is maintained by the operators of the DRMO facility. Excavation in the site area is restricted and groundwater intrusion is restricted. Plate 1-I depicts the restricted use boundary. The on-site production well is restricted from filling the fire suppressant tank except in an emergency. The IC limits are within the fenced area of the DRMO Yard, since 2001 only wells within the fenced area have exceeded the MCL.

Fort Wainwright has established a post-wide IC policy for all known or suspected contaminated sites.[4] This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No new potable water wells will be installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Site Inspection

In the summer of 2005, a site inspection was conducted. The inspection activities included checking the condition of the monitoring wells and the completeness of the remediation equipment.

A site visit was also conducted on June 6, 2006. All wells appeared intact and no problems were observed at any of the systems.

5.3.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Air Sparging and Soil Vapor Extraction

The SVE remedy selected to address VOC contamination at the DRMO yard site appears to have diminishing effects at reducing the levels of contaminants in the soil. This conclusion is supported by air effluent monitoring data that indicates decreasing amounts of VOCs removed at the site. Furthermore, groundwater data indicates that VOC levels have remained relatively stable throughout the last three years of sampling.

In 2005, the AS/SVE system was shut down to evaluate rebound effects and to determine the effectiveness of natural attenuation at the site.

Natural Attenuation with Groundwater Monitoring

Natural attenuation parameters have been monitored at the site during the last two years of sampling. The monitoring indicates that the air sparging process has created geochemical conditions near the system that do not favor natural attenuation, but geochemical conditions downgradient appear to be sufficiently anaerobic to permit some degree of attenuation.

[4] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

Since chlorinated compounds are typically reduced naturally via anaerobic pathways, the system was shut down to enhance the anaerobic environment in the fall of 2005. Data collected during the 2006 field season should provide insight to the effectiveness of natural attenuation at the site.

Institutional Controls

ICs are in effect and will continue to restrict site access and groundwater usage.[5]

Table 5-5 summarizes performance to date related to the RAOs for this source area.

Table 5-5. Performance to Date of Remedial Action Objectives at OU2 DRMO Yard

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame through source control	Groundwater monitoring data shows that the DRMO-1 Three-Party treatment system has been effective in reducing chemicals of concern (COCs). However, the influence of the treatment system has diminished during recent years. Groundwater data also shows an apparent degradation of PCE to TCE in DRMO-4 since the ROD
Reduce or prevent further migration of contaminated groundwater from the source areas	Groundwater monitoring since the ROD indicates that there has been no further migration of contamination from the source area.
Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act and State of Alaska Drinking Water Standard MCLs and AWQS	ICs restrict groundwater use in this area.
Use natural attenuation to attain AWQS (18 AAC 70) after reaching state and federal MCLs	Following attainment of MCLs natural attenuation will be evaluated by groundwater monitoring.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The assumption that contamination in soil will not leach into the groundwater may not be valid. Groundwater contamination levels have remained relatively constant over the past three years. The potential for off-site contamination moving into the site is being investigated in 2006.
- The assumption that the groundwater contamination will not migrate off of the site is validated by the groundwater monitoring results on site and at the picket wells. The assumption that the contamination will naturally attenuate is still being investigated.
- ICs are in effect and will continue to restrict groundwater usage.

[5] Post-wide IC policy is outlined in greater detail in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash – Fort Richardson, Alaska.

- There are no known changes in exposure pathways or populations at risk.
- The MCLs used to establish the groundwater cleanup goals for the DRMO Yard source area have not changed since the ROD.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances

There were no variances.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 5-6.

Table 5-6. Response to Recommendations from 2001 Five-Year Review

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Redraw the IC boundary to extend to the north to encompass the groundwater plume	The IC limits were re-drawn in 2002 to include the area north of wells AP-6807 and AP-6804; Natural attenuation monitoring began in 2004.	U.S. Army	2002	No

Recommendations and Follow-up Actions

The system is currently not operating in order to evaluate rebound and natural attenuation rates. The 2006 sampling results will be evaluated to determine if contaminant levels at the site show a large rebound effect. In addition, natural attenuation parameters will be evaluated in the absence of the oxygenated environment associated with the operation of the AS system. If significant improvement is seen in the rate of natural attenuation, the system may remain off and attenuation utilized as the primary remedial strategy.

The potential for contaminant migration from an off-site source into the DRMO Yard and treatment system area is being investigated via the installation of boundary wells along Badger Road. The data from these wells will help to determine if groundwater contamination is coming from another source not associated with the DRMO Yard. If no outside source is found, additional soil sampling may be conducted to attempt to delineate a point source of chlorinated contamination at the site. The recommendations and follow-up actions for the OU2 DRMO Yard are shown in Table 5-7.

Table 5-7. Recommendations and Follow-Up Actions for OU2 DRMO Yard

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Continue to evaluate sampling results and natural attenuation parameters to determine if the system should be turned back on	U.S. Army	EPA, ADEC	On-going	No

6 OPERABLE UNIT 3

6.1 OU3 Background

Operable Unit 3 (OU3) was the first Fort Wainwright OU to reach a final-action ROD. That ROD was signed in January 1996. It initially addressed four remedial areas, each of which had several sub-areas:

- Remedial Area 1a: Lead-contaminated soils near Birch Hill Tank Farm above-ground storage tanks (ASTs)
- Remedial Area 1b: Birch Hill Tank Farm and surrounding areas; includes six sub-areas:
  - Birch Hill Tank Farm Product Recovery System
  - CANOL Road Sub-Area
  - Former Building 1173 Sub-Area
  - Lazelle Road Sub-Area
  - Shannon Park Subdivision Sub-Area
  - Truck Fill Stand (TFS) Sub-Area
- Remedial Area 2: Railcar Off-loading Facility (ROLF) and surrounding areas; includes six sub-areas:
  - Valve Pit A
  - Valve Pit B
  - Valve Pit C
  - Central Header
  - Former Building 1144
  - Eight-Car Header
- Remedial Area 3: Along the Fairbanks-Eielson Pipeline (FEP); includes three source areas:
  - Milepost 2.7
  - Milepost 3.0
  - Milepost 15.75

As part of the ROD, the Army, EPA, and ADEC agreed to transfer Remedial Area 1a to OU5. This decision was made because more time was required to select an appropriate cleanup level and remediation goal for lead in soils. Remedial alternatives were determined for the remaining three areas in the OU3 ROD. The list of OU3 source areas and their status is shown in Appendix F.

6.2 OU3 Explanation of Significant Differences

The April 1996 ROD for OU3 at Fort Wainwright selected a remedy involving a combination of *in-situ* soil vapor extraction and air sparging of groundwater with natural attenuation to remove fuel-related contaminants in groundwater at the following source areas: the Birch Hill Tank Farm, a ROLF, and three milepost sites along the FEP (Mileposts 2.7, 3.0, and 15.75).

Implementation of the remedial actions in the ROD and additional historical research has provided a better understanding of the sources and volumes of contamination, groundwater movements, and geology of these sites than at the time of the RI/FS. The RI/FS, conducted in 1993, was limited in many areas and inadequate to determine the full extent of groundwater contamination. Post-ROD activities determined that the volume and lateral extent of contamination in OU3 is larger than previously identified. Based on this new information, a re-evaluation of the remedial actions in the ROD was conducted in 2002. The evaluation concluded that the remedies selected in the ROD would not fully achieve the RAOs without some significant changes.

An ESD for the OU3 ROD was prepared and finalized in 2002. This ESD was prepared in accordance with Section 117(c) of CERCLA and 40 CFR 300.435(c)(2)(I), and 300.825(a)(2) of the NCP. It documented significant differences to the selected remedies in the ROD, described the changes needed in some components of the selected remedy, and summarized the information that led to making the changes. These changes do not fundamentally alter the overall cleanup approach within OU3.

Detailed descriptions and discussions of the changes made in the ESD at each of the three OU3 remedial areas were provided in the above sections.

6.3 Remedial Area 1b –Birch Hill Tank Farm

6.3.1 Overview

Remedial Area 1b (Birch Hill Tank Farm) extends from Birch Hill south to the TFS and extends west toward Lazelle Road and east toward the Canadian Oil Pipeline (CANOL) service road. The Tank Farm, shown on Figure 6-1, is located north of the main cantonment area.

The Tank Farm and associated TFS was originally constructed as part of the 1943 CANOL Project. The CANOL Project was the construction of a 3-inch pipeline from Whitehorse, Canada, to Fairbanks. The Tank Farm originally consisted of fourteen 10,000-barrel capacity, bolted-steel above ground fuel tanks on top of Birch Hill which contained JP-4, mogas, and diesel fuels. The 14 tanks were connected by an 8-inch pipeline connected to the ROLF and the East Birch Hill UST Tank Farm. A post-ROD historical search indicated that a pump house with a slop tank was located at the base of Birch Hill. This is believed to be the major source associated with the Former Building 1173 Sub-area. The pump house was used until 1955 when the Haines to Fairbanks pipeline was constructed.

In 1955, as part of the new Haines Pipeline, two 25,000-barrel tanks, the TFS, and a new pump house and manifold building were erected. These new facilities were installed on Birch Hill, with the exception of the TFS that is located in the alluvial area south of the hill.

Contamination was initially discovered at this site during a soil-gas survey conducted in 1988. Further investigations identified petroleum contamination in subsurface soils and groundwater. The characterization of soil and groundwater contamination at the Tank Farm is complicated by permafrost, which initially led to underestimating the nature and extent of contamination in this area. Post-ROD studies led to a better understanding of the permafrost configuration and groundwater flow characteristics. Studies also indicated a three to four times greater aerial extent of contamination in the alluvial aquifer, including areas of free product (weathered AVGAS [aviation gasoline]) and elevated groundwater plume concentrations. Based on the decisions in the ROD, AS/SVE treatment systems were installed at the base of Birch Hill (Former Building 1173) and at the TFS in permafrost-free areas. These systems have been very successful in decreasing contaminant concentrations at the base of Birch Hill.

Additionally, Post-ROD, contamination was found within the Birch Hill bedrock aquifer both as free product and in the dissolved phase in the groundwater. Both 1,2-dichloroethane (DCA) and 1,2-dibromoethane (EDB) were identified at elevated concentrations in the bedrock aquifer. Investigations indicated that dissolved contaminants measured off-post are likely migrating in groundwater that comes in contact with free product identified in the fractured bedrock on Birch Hill. A product recovery system was installed on Birch Hill in 2000 and modified in 2001 to recover product and reduce potential contamination in off-post wells. An ESD explaining these differences was signed in 2002. Bottled water has been provided to bordering churches since 1995 and will continue until groundwater contaminant concentrations have decreased to below RAGs.

Important dates and events related to the history of the Birch Hill Tank Farm contamination and remediation activities are shown in Table 6-1.

Table 6-1. History of Regulatory Events at the OU3 Birch Hill Tank Farm[a]

Event	Date
Soil-gas survey conducted	1988
Fort Wainwright NPL listed	August 1990
FFA signed	1992
2-PTY signed	1992
Picket wells installed	1992
RI fieldwork conducted	September and October 1994
RI and Risk Assessment Reports submitted to EPA	October 1994
FS submitted to EPA	April 1995
ROD signed	January 1996
AS/SVE systems installed at Former Building 1173 and Lazelle Road	1996
Lazelle Road system relocated to the TFS and the Former Building 1173 system expanded to cover Lazelle Road source area.	1997
Product recovery treatability studies initiated at the Birch Hill Tank Farm.	1998
Thaw Channel treatment system installed	1999
First Fort Wainwright Five-Year Review report finalized	September 2001
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report completed	September 2002
Fort Wainwright Construction Complete concurrence received from the EPA	2002

[a] Information obtained from the OU3 ROD (U.S. Army 1996); Groundwater Extraction and Treatment Effectiveness Review (U.S. Army Oct. 2000); OU3 2005 Monitoring Report (FES, 2006f); and the OU3 ESD (U.S. Army 2002)).

6.3.2 Background

Physical Characteristics

Remedial Area 1b is located in the Chena River floodplain and is characterized by flat topography that gently slopes southward. The subsurface is typified by discontinuous permafrost and poorly drained soils covered by thick organic mats. Surface water ponding is common throughout the area from spring breakup until early to mid-summer. Wetlands are scattered throughout the area and shrub and forested wetlands border the southern portion. No endangered or threatened species reside in the area.

The Tank Farm Source Area has two distinct hydrogeologic areas: 1) the Birch Creek schist bedrock aquifer located from the top of the hill to the base of the hill, which includes the area beneath the ASTs on Birch Hill; and 2) the alluvial aquifer with discontinuous permafrost located south and west of the TFS, which includes private property, the Bentley Trust property and church properties.

Birch Hill consists of loess overlaying Birch Creek schist and other bedrock units. Groundwater flow in the bedrock aquifer at the Tank Farm is expected to occur mainly in fractures and to flow to the southwest.

The presence, location, and extent of permafrost from the base of Birch Hill southward to the Chena River significantly affect the groundwater flow direction in this part of the Tank Farm source area. Groundwater occurs in two zones above and below the permafrost in the alluvial aquifer. The suprapermafrost groundwater zone is the saturated zone above permafrost. The subpermafrost groundwater zone is the saturated zone beneath the permafrost. Groundwater occurs at approximately 20 to 22 ft-bgs in the TFS area at the base of Birch Hill in the suprapermafrost groundwater zone. Groundwater in this area flows to the west. Shallow discontinuous permafrost in this area may channel groundwater into thawed corridors that occur in meander scars, and a hydraulic connection may exist between the suprapermafrost groundwater zone in the thawed areas and the subpermafrost groundwater zone.

Land and Resource Use

The current land use is considered light industrial in the immediate remedial area and light industrial, recreational, and residential in the surrounding areas. The groundwater below Remedial Area 1b is not currently a source of drinking water. The closest water supply wells to the Tank Farm Source Area are located at the Shannon Park Baptist Church and Steese Chapel on Lazelle Road, approximately 1/4 miles west of the Tank Farm. Neither of these wells are currently used for drinking water purposes.

History of Contamination

A majority of the contamination within the bedrock is from receiving fuels from Haines Terminal, cleaning and dewatering of ASTs and operational spills. At the TFS, the majority of contamination was due to spills during truck filling activities and operational spills. USTs located at the base of the hill are thought to be a source of petroleum contamination through spills and overfilling or leaking.

The RI for Remedial Area 1b focused mainly on the base of Birch Hill; thus all monitoring wells were installed in alluvial material. At the time of the RI, no wells or deep borings were installed on Birch Hill, thus missing free product within the bedrock aquifer. Post-ROD activities, which identified the free product, have led to the addition of a sub-area known as the Birch Hill Product Recovery System. This was documented in the ESD, which was signed in 2002.

Two of the sub-areas investigated during the RI/FS indicated no remedial action was required. The Shannon Park Subdivision Sub-area and the CANOL Road Sub-area were both recommended for no further action in the OU3 ROD.

Pre-ROD Response

There were no pre-ROD responses for the Remedial Area 1b source area.

6.3.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at Remedial Area 1b are associated with fuel and fuel additives storage, transfer, and handling activities and the Fairbanks Fuel Terminal and the TFS.

Site investigations characterized contamination associated with Remedial Area 1b as follows:

Groundwater

Benzene, toluene, ethylbenzene, EDB, DCA, 1,2,4-trimethylbenzene (TMB), and 1,3,5-TMB were detected in groundwater at the base of Birch Hill and in the downgradient west transport pathway in concentrations exceeding federal drinking water MCLs and EPA risk-based concentrations used for screening potential contaminants of concern.

Soil

Petroleum hydrocarbons were identified and quantified as diesel in surface soil and Jet A in subsurface soil.

Remedial Action Objectives

The remedial action objectives are generic for all source areas in OU3.

Groundwater

- Restore groundwater to drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater
- Prevent use of groundwater with contaminants at levels above Safe Drinking Water Act levels

Soil

- For petroleum-contaminated soil, prevent migration of contaminants from soil into groundwater that would result in groundwater contamination and exceedance of Safe Drinking Water Act standards

ARARs

The OU3 ROD cited the most significant ARARs for remedy selection at Remedial Area 1b to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for OU3. There were no source specific cleanup goals for this source area.

Groundwater

- Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, toluene, ethylbenzene, EDB, and DCA.
- The concentration corresponding to the EPA excess cancer risk (10^{-4}) based cleanup level was adopted as the cleanup goal for 1,2,4-TMB and 1,3,5-TMB, since there were no MCLs for these contaminants.

Soil

- The remedial action goal for *in-situ* soil contaminated with volatile organic and petroleum compounds is protection of groundwater. Because the soils are acting as a continuing source of contamination to the groundwater, active remediation of the soils will continue until Safe Drinking Water Act levels are consistently met. Natural attenuation will continue until AWQS achieved.
- Petroleum contaminated soils that are treated *ex-situ* will be treated to State of Alaska Matrix Level A standards[1] before they are returned to the source area.

RAGs from the ROD and current MCLs for all chemicals of concern at OU3 are shown in Table 6-2.[2]

Selected Remedy

The selected remedy in the ROD was soil vapor extraction of petroleum-contaminated soil and air sparging of petroleum-contaminated groundwater in permafrost-free areas at known contaminant sources and at locations where MCLs were exceeded to achieve Safe Drinking Water Act levels. Additional remedies included ICs, restricting access to and development at the site as long as hazardous substances remain at concentrations above MCLs; long term groundwater monitoring; and natural attenuation to meet AWQS. During the summer and fall of

---

[1] These standards are now calculated under Method One and can be found in Tables A1 and A2 in 18 AAC 75.

[2] Source-specific cleanup levels were not developed for OU3, therefore all three Remedial Areas in OU3 have the same chemicals of concern and cleanup levels.

2000 a product recovery system was installed on Birch Hill. This sub-area was not a part of the OU3 ROD but was established as part of the ESD. In addition, the ESD required the implementation of groundwater modeling.

Table 6-2. Cleanup Levels for Chemicals of Concern at OU3

Media	Chemical of Concern	ROD Cleanup Level	Basis	Current Cleanup Level[a]
Groundwater	Benzene	5 µg/L	MCL[a]	5 µg/L
	Toluene	1,000 µg/L	MCL[a]	1,000 µg/L
	Ethylbenzene	700 µg/L	MCL[a]	700 µg/L
	EDB	0.05 µg/L	MCL[a]	0.05 µg/L
	DCA	5 µg/L	MCL[a]	5 µg/L
	1,2,4-TMB	14 µg/L	Risk-Based[b]	1,850 µg/L[c]
	1,3,5-TMB	12 µg/L	Risk-Based[b]	1,850 µg/L[c]

[a] MCLs from NPDWR and 18 AAC 75 Table C, unless otherwise noted.
[b] Based on risk-based concentrations (RBC) equivalent to a non-cancer hazard quotient of 1 using residential groundwater exposure assumptions.
[c] Calculated cleanup levels based on residential exposure parameters and toxicity data from EPAs IRIS database (ADEC technical memorandum 01-007 "Additional Cleanup Values", November 24, 2003)

AS/SVE

The pilot scale AS/SVE systems were installed at three sites (Lazelle Road, Former Building 1173, and the TFS) during the summer of 1996. The OU3 ROD specified that due to different site conditions, site specific design information would be collected in a pilot study. In addition, if during systems implementation or operations the remedy is determined not to be effective or contaminant levels cease to decline, the system performance and/or the remedy may be re-evaluated.

Institutional Controls

ICs have been established and are maintained to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies. ICs include restrictions governing site access, construction and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use.

6.3.4 Status of Remediation

The Birch Hill Tank Farm remedial systems have been effective in the removal of free product and the reduction of both the magnitude and extent of groundwater contamination.

Status of Selected Remedy by Sub-area

Lazelle Road Sub-Area

An AS/SVE treatment system was installed in 1996 to remove VOCs and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. AS wells were placed in areas of highest contamination (hot spots). The Lazelle Road treatment system was removed in 1997 and the site was incorporated into the Former Building 1173 Sub-area system.

Former Building 1173 Sub-Area

An AS/VE treatment system was installed in 1996 at the Former Building 1173 Sub-Area to remove VOCs and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. In 1997 this system was expanded in size to treat additional contaminated areas, including the Lazelle Road Sub-area. In addition, thermal oxidizers were installed to reduce atmospheric emissions. The system was operated seasonally between 1996 and 2001. From 2002 through 2005, the AS system operated year round and the SVE system operated seasonally. The oxidizer was operated between September 1997 and June 2001. In 2005, the Former Building 1173 treatment system was shut down for a rebound study. To date the treatment system has removed 81,438 pounds of VOC.

Truck Fill Stand Sub-Area

An AS/VE system was installed in the area of the TFS in 1997 for the removal of VOCs in groundwater and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. Groundwater was successfully treated at the TFS; therefore, treatment system shut-down and rebound evaluation at the TFS began in January 2004. To date the treatment system has removed 5,268 pounds of VOC.

Thaw Channel

In 1999, an AS treatment system was installed as part of a treatability study to reduce contaminants migrating off-post through a permafrost thaw channel. This system has been effective and was retained as part of the remedy for this subarea. DCA concentrations have decreased in most Thaw Channel area wells since the treatment system became operational. However, since there were few monitoring wells in the area that had been sampled prior to the installation of the system, it is not known whether this trend began before or after the system installation. The treatment system was shut down on November 10, 2005, to conduct a contaminant rebound study. To remain protective of groundwater downgradient, it was agreed that the Thaw Channel system would be restarted if there is an increasing trend of contaminant concentrations on post.

A coordinated shut-down of the Thaw Channel treatment system, Former Building 1173, and Product Recovery will aid the evaluation of the influence of the operation of this treatment system on the decline of DCA concentrations.

Birch Hill Tank Farm Product Recovery System

Floating product was discovered in large amounts on the bedrock aquifer on Birch Hill during the 1997 field season. In 1998 active and passive skimmers were installed in various wells located on the hill. In 1999 a pilot scale recovery system was installed in newly installed wells. During the summer and fall of 2000 a product recovery system was installed on Birch Hill. A number of system modifications were made to improve the treatment system effectiveness and reliability. The system was operated in 2000, 2001, 2002, and seven months in 2003. The system was shut down and a rebound study was initiated during July 2003 because the system was not effective in recovering product during 2003 and off-post contaminant concentrations were below RAGs. The purpose of this study is to evaluate contaminant migration from Birch Hill to downgradient wells and to determine whether or not operation of the product recovery system is necessary and effective. This sub-area was not a part of the OU3 ROD but was established as part of the ESD.

Groundwater Monitoring

Plate 6-I summarizes the results of groundwater monitoring in the alluvial aquifer associated with the Former Building 1173, TFS, Thaw Channel, and the off-post wells. Plate 6-II summarizes the results of groundwater monitoring in bedrock wells associated with the Birch Hill Product Recovery source areas and bedrock wells at the base of Birch Hill.

Former Building 1173

There are currently eight wells sampled semi-annually (spring and fall) at Former Building 1173. Dissolved contaminant concentrations in the alluvial aquifer downgradient of the treatment system decreased to below RAGS in 2004 and remained below RAGs throughout 2005. No COC were detected above RAGs within or downgradient of the treatment system area during 2005. Rebound has not been observed since the system was shut down in July 2005.

Truck Fill Stand

Currently, three wells are sampled semi-annually (spring and fall) at the TFS. During the fall 2005 sampling event, EDB increased slightly and exceeded the RAG in GWP-145; however, no other contaminants exceeded the RAG during the 2005 rebound study. Since groundwater contaminant concentrations did not increase overall during 2005, with the exception of EDB this treatment system will remain off throughout the 2006 operational year and the rebound study will be continued utilizing the current monitoring points.

Thaw Channel

Groundwater sampling events were conducted semi-annually (spring and fall) at eight Thaw Channel area wells (including one multi-level well), five Bentley Trust wells, and two Church Sub-area wells. The DCA RAG was not exceeded at any sampling location and no other COC exceeded the RAG during the 2005 sampling events.

DCA concentrations either continued to decline or were relatively stable at the Thaw Channel wells during 2005. A seasonal trend continues to be apparent in AP-5782, with spring DCA concentrations always being greater than fall DCA concentrations; however, DCA has been below the RAG in AP-5782 since 2002. The DCA concentration was below the RAG in AP-7844 during both 2005 sampling events for the second consecutive year since sampling began at this well in 1999. AP-7598, which is a bedrock well screened near the alluvial interface, has had consistent concentrations of DCA below the RAG.

DCA was detected in Port 6 (the shallowest port) of multi-ported well AP-8891 during the March 2005 sampling event at a concentration below the RAG. Benzene was detected below the RAG in Ports 1, 2, 3 and 5 during each of the sampling events and in Port 4 during the March 2005 sampling event.

DCA was detected below the RAG in four wells located on Bentley Trust property during 2005: Discernible trends in DCA concentrations are not apparent in these wells; however, DCA has not exceeded the RAG at any of these wells since they were installed in 2001.

During the winter and spring of 2006, the Bentley Trust Property was sold and cleared for development. Six of the fifteen wells in the Thaw Channel monitoring well network were removed by the new property owner. These wells will be replaced once construction on the property has been completed.

Birch Hill Product Recovery

Past product recovery efforts have resulted in a significant reduction in product thicknesses and groundwater contaminant concentrations. Consistent decreasing trends in benzene, DCA, and EDB concentrations were evident in many of the monitoring and extraction wells located within the influence of the treatment system when the treatment system was in operation. However, contaminant concentrations generally remain several orders of magnitude above RAGs in most monitoring wells within the extraction area.

Seven sampling events have been conducted since the treatment system was shut down in 2003; product thickness has not significantly increased in wells located in the area of the Product Recovery since the shut-down. DCA concentrations have increased in many wells located on and at the base of Birch Hill; however, increases have not been observed in farther downgradient wells (Thaw Channel and/or off-post). Generally benzene concentrations have continued to decrease in wells on or at the base of Birch Hill. EDB concentrations in several wells located east of the Product Recovery extraction area have shown a consistent increasing trend.

Off-Post Investigation

As outlined in the ESD, routine monitoring and sampling of off-post wells was required. In early 2006, the property adjacent to the Birch Hill Tank Farm source area was sold. The property was purchased by a housing developer for the purpose of building a new subdivision, Lazelle Estates. The Army had a right of entry (ROE) permit with the previous owner, Bentley Trust. The ROE provided access for the Army to install and sample groundwater monitoring wells. Six of the 15 monitoring wells in the Thaw Channel monitoring program were located off-Post on the former Bentley Trust property. The wells were part of the active groundwater monitoring program and were sampled twice a year. In April 2006 the six wells on the former Bentley Trust were removed by the new property owner for construction of the new subdivision. The Army did not yet have a ROE permit or access agreement with this new property owner. No contaminants of concern above ROD levels have been detected in any off-Post wells, including those removed, since July 2000.

The subsequent removal of these six monitoring wells in April 2006 by the new land owner led the RPMs to develop an action memorandum. The first draft *Technical Memorandum, Birch Hill Tank Farm* memorandum was distributed via e-mail May 31, 2006. This summarized the discussion, actions and agreements that occurred during the 18 May 2006 teleconference. This document with subsequent updates can be found in Appendix G.

Institutional Controls

ICs for Remedial Area 1b are in effect, which include policies to limit excavation or well installation in potentially contaminated sites. Plate 1-I depicts the restricted use boundary.

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites.[1] This policy was last updated in 2002, but is currently under review and a new update is expected in 2006. There have been no violations of the IC policy to date. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and

[3] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska ICs Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on ICs [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Site Inspection

A site inspection was conducted by the U.S. Army Corps of Engineers on June 6, 2006 during which all Remedial Area 1b source areas were visited. No problems were noted at any of the sites, with the exception of the wells removed from the former Bentley Trust property, as discussed above. Photographs taken at the time of the site inspection are included in Appendix C of this report.

6.3.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

AS/SVE Systems

Two small scale AS/SVE treatment systems, Former Building 1173 and Lazelle Road Treatment Systems, were implemented in 1996. The Former Building 1173 treatment system was expanded to include the Lazelle Road treatment area and the Lazelle Road treatment system equipment was relocated to the TFS area in 1997. These two AS/SVE systems (Former Building 1173 and TFS) were shut down after contaminant concentrations in groundwater treated by these systems were reduced to below RAGs for two or more consecutive years. Results from the 2005 Monitoring Report indicate concentrations of chemicals of concern in soil and groundwater are continuing to decrease. These three systems have removed a total of 86,706 pounds of VOCs from the soil and groundwater.

An Air Sparge treatment system was originally installed at the Post boundary within the Thaw Channel during 1999 and modified in 2000. This system was also shut down after contaminant concentrations in groundwater treated by these systems were reduced to below RAGs.

Product Recovery System

In 1998 active and passive skimmers were installed in various wells located on Birch Hill. In 1999 a pilot scale recovery system was installed and during 2000 a full scale product recovery system was implemented. Product recovery efforts on Birch Hill have resulted in the recovery of approximately 5,500 gallons of weathered gasoline. Most of the product recovery occurred between 1998 and 2002. During 2004 and 2005 no product has been recovered as a result of shut-down for the rebound study and because minimal product thickness have been measured in wells. All existing systems in Remedial Area 1b are determined to be operational and functional.

Institutional Controls

ICs are in place at Remedial Area 1b. Excavation on this site is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental.

The base-wide IC policy is outlined in greater detail in the OU5 ROD, the U.S. Army Alaska ICs Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on ICs [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash – Fort Richardson, Alaska.

The IC access restriction boundary does not extend to the area off-post on the Bentley Trust Property where groundwater monitoring and natural attenuation is occurring, however the downgradient property owners are kept informed of the ongoing work, and the Army provides bottled water to the two churches as specified in the ROD.

Summary

Table 6-3 summarizes performance to date related to the RAOs for the Birch Hill Tank Farm.

Table 6-3. Performance to Date of Remedial Action Objectives at OU3 Birch Hill Tank Farm

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	• Contaminant concentrations have decreased to below RAGs at the Former Building 1173, TFS, and Thaw Channel sites. • Contaminant concentrations have remained stable or increased at the base of Birch Hill since the Product Recovery System was shut down, but have decreased and remain below RAGs in downgradient wells. • The extent and thickness of free product in wells located on Birch Hill has been significantly reduced.
Reduce further migration of contaminated groundwater from the source areas	No additional growth of plume or increase in contaminant concentrations
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS; 18 AAC 70)	ICs in effect and no violations of these controls have been identified
Use natural attenuation to attain AWQS (18 AAC 70)	Long term groundwater monitoring is being conducted and contaminant concentrations have been decreasing since signing of the ROD

Birch Hill Summary Report

A summary report is being prepared to document the remedial investigations, monitoring, and actions that have been conducted at this source area. This report is intended to incorporate all available information about the Birch Hill source area and will include: a summary of all the investigations and remedial actions that have been conducted; a description of the remedial systems and how they have functioned; and a detailed discussion of the conceptual site model and how it has changed and evolved based on the new information that has been obtained since the ROD. This summary report will be a tool that the RPMs can use to determine future actions at the source area, such as optimization of systems, modifications to monitoring programs, and an evaluation for a potential Technical Impracticability of Groundwater Restoration Waiver.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways. A new housing subdivision is being constructed in the area adjacent to and downgradient of Birch Hill. Since the subdivision will be connected to the city water system, there is no added risk associated with the use of potentially contaminated groundwater.
- The remedial goals for 1,2,4-TMB and 1,3,5-TMB that were established in the ROD were base on RBCs, but were erroneously selected from the wrong column in the RBC tables. Appropriate goals for these chemicals were established in the ESD.
- There have been no other changes in RBCs used to establish OU3 cleanup goals.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

Following the removal of six of the off-Post monitoring wells on the Bentley Trust property in April 2006, an evaluation was conducted to determine if the wells removed affected the off-Post monitoring program. Following this evaluation the monitoring program was modified to increase the frequency of monitoring at existing downgradient wells until new replacement wells could be installed. In the short term the existing monitoring network provides adequate coverage to ensure that the remedy is protective.

No other information has arisen that would question the protectiveness of the current remedy.

Variances

The following variances were identified in the review of OU3 Birch Hill Tank Farm Source Area protectiveness and remediation process.

Table 6-4. Variances Identified at OU3 Birch Hill Tank Farm

Variances	Currently Affects Protectiveness (Y/N)
Groundwater flow system not fully characterized. Interactions between bedrock aquifer and alluvial aquifer not understood.	No
Fate and transport of DCA not understood.	No
Fate and transport of EDB not understood.	No

Recommendations

Recommendations in this section will be coordinated with recommendations agreed to in the Birch Hill Tank Farm Summary Report. Recommendations and Follow-Up Actions for OU3 Birch Hill Tank Farm are shown in Table 6-5.

Table 6-5. Recommendations and Follow-Up Actions for OU3 Birch Hill Tank Farm

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Complete Birch Hill Tank Farm Summary Report	U.S. Army	EPA / ADEC	2007	No
Pursuant to authority granted by Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), make every reasonable effort to obtain a signed access agreement for the Army, its contractors, agents, U.S. EPA, and ADEC to install and monitor new wells on the former Bentley property. The access agreement should provide that no conveyance of title, easement, or other interest in the property shall be consummated without provisions for the continued operation of such wells.	U.S. Army	EPA / ADEC	When roads and infrastructure of housing development has been completed	No

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 6-6.

Table 6-6. Response to Recommendations from 2001 Five-Year Review

Recommendation/ Follow-Up Actions from 2001 Five-Year Review	Action Completed	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes / No)
Further characterization of aquifer interactions	Several studies have been conducted since the 2001 Five-Year Review to better characterize the aquifer in this area, including: pump tests, dye-tracer studies, GW modeling, and geophysical surveys	U.S. Army	EPA / ADEC	Ongoing	No
Gather data on fate and transport of DCA	Several monitoring wells were installed along CANOL Road to evaluate the potential for contaminant migration in this direction and to verify groundwater model predictions. Additional groundwater modeling is planned. Also, based on the outcome of discussions for the Birch Hill Summary Report we may find that it is not possible to characterize the Birch Hill DCA or EDB fate and transport.	U.S. Army	EPA / ADEC	Ongoing	No

6.4 Remedial Area 2 – Valve Pits and ROLF

6.4.1 Overview

Remedial Area 2 is located south of the Tank Farm Facility across the Chena River (except for Valve Pit A) and north of Gaffney Road. Valve Pit A is located on the west side of the Chena River; Valve Pits B and C are both located on the east side of the Chena River, and the headers are located in the central ROLF. Remedial Area 2 was subdivided into six sub-areas based on geographic location and differing physical characteristics. Figure 6-2 shows the six sub-areas: Valve Pit A, Valve Pit B, Valve Pit C, Central Header, Former Building 1144, and Eight-Car Header.

The ROLF was built in 1939 to receive fuel from tanks on railcars and to distribute the fuels to the airfield refueling points, quartermaster fuel system, and the Birch Hill AST Tank Farm. The facility covers an area of approximately 40 acres. As part of this distribution system, there were six valve pits (three of which were specified as sub-areas) and the headers where the fuel was off-loaded from the tank cars. Fuel pipelines connect the ROLF to the Birch Hill AST Tank Farm (Remedial Area 1b) via the valve pits. Fuel was also stored in USTs within Remedial Area 2 until the tanks were removed in 1990.

Investigations at these sites began in 1988. Petroleum contamination was identified in subsurface soils and groundwater at Valve Pits A, B and C, and in surface and subsurface soils and groundwater in the Central ROLF area during preliminary investigations. In 1994, an RI/FS was conducted to further investigate and delineate contaminant sources and to recommend remedial alternatives. Based on the decisions in the ROD, AS/SVE treatment systems were installed at the three valve pit sites (Valve Pits A, B, and C), and at two sites within the Central ROLF (Central Header, and Former Building 1144) during the summer of 1996.

Through implementation of the remedial actions in the ROD, additional historical research, and subsequent sampling results, it was discovered that the sources and volumes of contamination, encompassed a larger area than originally identified. The systems were expanded in 1997 and 1998 to treat the larger area, including installation of a sixth system (Eight-Car Header). An ESD that documents the changes in some components of the selected remedy described in the ROD and summarizes the information that led to making the changes was signed in 2002.

These systems have been very successful in decreasing contaminant concentrations within the treatment area. In 2004 the three ROLF systems were expanded to include areas upgradient of the AS/SVE systems that were not being effectively treated. In 2005, the systems at Valve Pits B and C were decommissioned and a long term groundwater monitoring program was established to monitor groundwater contaminant concentrations that have been reduced to acceptable levels. ICs are in place, and informational signs have been installed at the ROLF to inform the public of restrictions and activities in this area.

Important dates and events related to the history of the ROLF contamination and remediation activities are shown in Table 6-7.

Table 6-7. History of Regulatory Events at the OU3 Valve Pits and ROLF[a]

Event	Date
Soil-gas survey conducted	1988
Monitoring wells installed	1989
Fort Wainwright listed on NPL	August 1990
FFA signed	1992
2-PTY signed	1992
RI fieldwork conducted	Sept. and Oct. 1994
RI and Risk Assessment Reports submitted to EPA	October 1994
FS submitted to EPA	April 1995
ROD signed	January 1996
Design Verification Study 35 Percent Design Analysis completed	April 1996
AS/SVE treatment systems installed at Valve Pits A, B, & C; Central Header; and Former Building 1144 source areas	July and August 1996
Design Verification Study 65 Percent Design Analysis completed	May 1997
AS/SVE systems expanded	1997
AS/SVE treatment system installed at the Eight Car Header sub-source area; Central Header and Former Building 1144 treatment systems further expanded	1998
First Fort Wainwright Five-Year Review Report finalized	September 2001
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report completed	September 2002
Fort Wainwright Construction Complete concurrence received from the EPA	2002
AS/SVE treatment system at Eight-Car Header expanded to include upgradient area; Central Header and Former Building 1144 treatment systems also expanded	2004
AS/SVE systems at Valve Pits B and C decommissioned	2005

[a] Information obtained from the OU3 ROD (U.S. Army 1996); Groundwater Extraction and Treatment Effectiveness Review (U.S. Army Oct. 2000); OU3 2005 Monitoring Report (FES, 2006); and the OU3 ESD (U.S. Army 2002).

The main area of the ROLF is within the Chena River floodplain. A scrub-shrub wetland borders the northeast edge of the ROLF. No endangered or threatened species reside in the area.

Groundwater in the shallow aquifer zone generally flows northwest towards the Chena River. Flow direction and gradient is subject to seasonal variations. Depth to groundwater in the vicinity of the ROLF is approximately 10 to 20 ft-bgs.

6.4.2 Background

Physical Characteristics

The ROLF is located immediately north of the Fort Wainwright airstrip and is bounded on its north and west sides by the Chena River and Gaffney Road to the south (see Figure 6-2). Valve Pit A is approximately 0.25 miles east of the 801 Housing Subdivision on the north bank of the Chena River.

Land and Resource Use

The area around Remedial Area 2 is used heavily by residents and nonresidents involved in recreational sport fishing, boating and hiking. Groundwater use is residential. Numerous residential wells are located on the north bank of the Chena River, less than 0.5 mile downstream. The Golden Heart Utilities and College Utilities wells are located approximately three and five and a half miles from the source area, respectively. Four Fort Wainwright drinking water supply wells and the Pioneer Class A drinking water wells for the Hamilton Subdivision are located approximately one mile from the ROLF. Future land and groundwater use is considered to be residential and recreational.

History of Contamination

The primary sources of contamination at Remedial Area 2 are associated with fuel and fuel additives from storage, transfer, and handling activities at Valve Pit A, Valve Pit B, Valve Pit C, Central Header, Former Building 1144, and Eight-Car Header at the ROLF. Available records indicate that one 20-gallon fuel spill occurred at the ROLF between 1970 and 1987. It is also known that the tank car headers were prone to minor leaks, and at least one major spill of JP-4 occurred at one of the headers. Additionally, the USTs formerly at the central ROLF reportedly were overfilled on numerous occasions. In 1991, a pipeline from Valve Pit C to the airfield failed a hydrostatic pressure test and was taken out of service. Valve pits on both sides of the Chena River and at the ROLF had leaks.

In 1988 a soil-gas survey was conducted at the ROLF and associated valve pits. Samples collected revealed a contaminant plume centered on the railroad spur containing the 16-tank-car (Central Header) unloading headers and the former USTs. A monitoring well was installed at Valve Pit C in 1989 and contained free-floating product in most of the sampling events until commencement of remedial activities. During investigations in the summer of 1996 up to 1-½ feet of floating product was measured in monitoring wells. The findings from these investigations indicated subsurface contamination in hot spots throughout the area, especially in the vicinity of valve pits located along the pipeline system, which consisted of three 8-inch pipelines and four 3-inch pipelines. Petroleum contamination was identified in subsurface soils and groundwater surrounding Valve Pits A, B, and C, along Front Street, and in surface and subsurface soils and groundwater in the center of the site during the RI.

Pre-ROD Response

There were no pre-ROD responses for the Remedial Area 2 source area.

6.4.3 <u>Remedy Selection</u>

Nature of Contamination

The primary sources of contamination at Remedial Area 2 are associated with fuel additives and the storage, transfer, and handling of fuel at Valve Pits A, B, and C, Central Header, Eight-Car Header, and Former Building 1144 at the ROLF.

Site investigations characterized contamination associated with Remedial Area 2 as follows:

<u>Groundwater</u>

Benzene, toluene, ethylbenzene, EDB, DCA, 1,2,4-TMB, and 1,3,5-TMB were detected in groundwater at levels exceeding federal drinking water MCLs or EPA risk-based concentrations used for screening potential contaminants of concern.

Soil

Petroleum hydrocarbon were identified and quantified as diesel in surface soil and Jet-A in subsurface soil.

Remedial Action Objectives

The remedial action objectives are generic for all source areas in OU3.

Groundwater

- Restore groundwater to drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater
- Prevent use of groundwater with contaminants at levels above Safe Drinking Water Act levels

Soil

- For petroleum-contaminated soil, prevent migration of contaminants from soil into groundwater that would result in groundwater contamination and exceedance of Safe Drinking Water Act standards

ARARs

The OU3 ROD cited the most significant ARARs for remedy selection at Remedial Area 2 to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for OU3. There were no source specific cleanup goals for Remedial Area 2.

Groundwater

- Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, toluene, ethylbenzene, EDB, and 1,2-DCA.
- In the ROD, the remedial goals for 1,2,4-TMB and 1,3,5-TMB were based on an RBC equivalent to a non-cancer hazard quotient of 1 using a residential groundwater exposure assumption, since there were no MCLs for these contaminants. However, the values established in the ROD were erroneously selected from the wrong column in the Region 3 RBC tables. The values listed in the ROD for these chemicals correspond to an inhalation pathway. The residential groundwater assumptions in the RI/FS correspond to a remedial goal of 1.85 mg/L for both compounds. This issue was discussed in the ESD.

Soil

- The remedial action goal for *in-situ* soil contaminated with volatile organic and petroleum compounds is protection of groundwater. Because the soils are acting as a continuing source of contamination to the groundwater, active remediation of the soils will continue until Safe Drinking Water Act levels are consistently met. Natural attenuation will continue until Alaska Water Quality Standards are achieved.
- Petroleum contaminated soils that are treated *ex-situ* will meet State of Alaska Matrix Level A standards before they are returned to the source area.

RAGs from the ROD and current MCLs for all chemicals of concern at OU3 are shown in Table 6-2.

Selected Remedy

The selected remedy in the ROD was soil vapor extraction of petroleum-contaminated soil and air sparging of petroleum-contaminated groundwater at known contaminant sources and at locations where RAGs were exceeded (i.e., hot spots) to achieve Safe Drinking Water Act levels. Additional remedies included ICs, restricting access to and development at the site as long as hazardous substances remain at concentrations above RAGs; groundwater monitoring; and natural attenuation to meet AWQS.

AS/SVE

The pilot scale AS/SVE systems were installed at five sites (Valve Pits A, B, and C, Central Header, and Former Building 1144) during the summer of 1996. The OU3 ROD specified that due to different site conditions, site specific design information would be collected in a pilot study. In addition, during implementation or operations of systems, if the remedy was not effective in achieving the performance standards, the system would be expanded and/or the remedy would be re-evaluated. The five systems were expanded and a sixth system (Eight-Car Header) was installed in 1997 and 1998.

Institutional Controls

ICs have been established and are maintained to ensure that the groundwater will not be used until federal and state MCLs are attained. ICs include restrictions governing site access, construction, and water supply well installation as long as hazardous substances remain on site at levels that preclude unrestricted use.

6.4.4 Status of Remediation

The ROLF remedial systems have been effective in the removal of free product and the reduction of both the magnitude and extent of groundwater contamination.

AS/SVE Treatment Systems

Valve Pit A

The AS/SVE system was initially installed in 1996, expanded in 1997, and further expanded to its current size, consisting of four treatment zones, in 2000. In 2004, two of the treatment zones (Zones 1 and 3) were shut down to conduct a rebound study because contaminant levels in the groundwater had dropped to below RAGs in those areas. In 2005, Zone 4 was also shut down for a rebound study. Currently, only the air sparge system for Zone 2 is being operated to treat benzene that remained above the RAG in 2005. Figure 6-3 shows the treatment system layout and the zone currently being operated. To date the treatment system has removed 23,204 pounds of VOCs.

Valve Pit B

The AS/SVE system was initially installed in 1996 and expanded in 1997. The treatment system was operated seasonally. The benzene plume exceeding the ROD cleanup goal was eliminated in this treatment area by 2001. In 2003, the system was shut down for a rebound study. The system was decommissioned in 2005 after two years of system shut-down with no significant contaminant rebound occurring. A long-term groundwater monitoring program is currently being conducted at the site. Before it was shut down in 2003, the treatment system had removed a total of approximately 31,432 pounds of VOCs.

Valve Pit C

The AS/SVE system was initially installed in 1996 and expanded in 1997. The treatment system was operated seasonally. Between 1996 and 1998, benzene concentrations within the treatment area decreased by two orders of magnitude, to concentrations below the RAG. In 1998, the system was shut down for a rebound study. Following the initial system shut-down, benzene levels rebounded briefly in several wells but then dropped back down to below the RAG after restarting the system in 1999. However, benzene is detected consistently at a level slightly above the RAG at one downgradient location (VPC-MP6), which is believed to have been located just outside the treatment system influence. The system was shut down again in 2001 and groundwater was monitored for rebound. The system was decommissioned in 2005 after three years of system shut down with no significant contaminant rebound occurring. Before it was shut down, the treatment system had removed a total of approximately 10,450 pounds of VOCs.

Central Header

The AS/SVE system was initially installed in 1996, expanded in 1997, and further expanded to its current size of eight treatment zones, in 2000. The treatment system operates year round. Off-gas emissions were controlled by the use of a thermal oxidizer until February 2002 when the oxidizer was taken off-line because vapor concentrations had dropped and it was no longer necessary to control emissions at this system. As of 2005, the treatment system has removed 273,667 pounds of VOCs.

The extent of the benzene plume exceeding RAGs has been significantly decreased through AS/SVE treatment in this area. With the exception of one "hot spot", contaminant concentrations within the treatment area have been decreased by two orders of magnitude or more. As contaminant concentrations have decreased and remained below RAGs, various zones within the system have been shut down for rebound studies. Currently, Zones 2, 4, 5, and 6 are off for rebound evaluation; portions of Zones 1, 3 and 8 are being operated in AS only mode; and Zone 7 is operating in AS/SVE mode. Figure 6-4 shows the treatment system layout and the zones currently being operated.

One 'hot spot' at the Central Header system no longer appears to be responding to the existing treatment system configurations. Revisions to the system, in the form of additional sparge probes installed at decreased spacing around the 'hot spot', has been proposed and is being considered by the RPMs. Based on the success observed at all these systems to date, focusing air-flow in the 'hot spot' area should complete the remediation of the remaining soil and groundwater contamination.

Former Building 1144

The AS/SVE system was initially installed in 1996 and expanded in 1997 to include six treatment zones. In 2004, two additional upgradient zones (7 and 8) were added to the system. The treatment system operates year round. A thermal oxidizer was used for off-gas emission control until May 2001 when the oxidizer was taken off-line because vapor concentrations decreased and it was no longer necessary to control emissions at this system. As of 2005 the treatment system has removed 246,485 pounds of VOC.

Benzene concentrations within the treatment area have decreased by an order of magnitude, and the extent of the benzene plume exceeding the RAGs has decreased significantly. As contaminant concentrations have decreased and remained below RAGs, various zones within the system have been shut down for rebound studies. Currently, Zones 2, 3, 5 and 6 are shut off for rebound evaluation; Zones 1, 4, 7 and 8 are being operated in AS/SVE mode. Figure 6-5 shows the treatment system layout and the zones currently being operated.

There is one 'hot spot' at the Former Building 1144 site that no longer appears to be responding to the existing treatment system configurations. As with the Central Header system, revisions to the system in the form of additional sparge probes installed at decreased spacing around these 'hot spots' is being considered by the RPMs.

Eight Car Header

The AS/SVE system was initially installed in 1997 as an expansion zone of the Former Building 1144 system, but was expanded as a separate system in 1998. Off-gas emissions were controlled by the use of an electric oxidizer. In 2002, a CLOSES evaluation was conducted at this site that recommended shutting down the system for a rebound study. The system was shut down in October 2002. After benzene levels in some wells rebounded to unacceptable levels, Zones 1, 2, and 3 of the system were turned back on in April 2004. Zones 1, 2, and 3 operated until October 2004 when they were again shut down after cleanup goals were achieved.

The system was also expanded in 2004 to include two additional zones, which are located upgradient, south of the Alaska Railroad tracks. Currently, only the two upgradient zones are operating. Figure 6-6 shows the treatment system layout and the zones currently being operated. As of 2005 the treatment system has removed 149,936 pounds of VOCs.

All Systems

Between 2002 and 2004, approximately 700 air sparge and soil vapor extraction probes in the six ROLF systems were rehabilitated using the "hydro-shock" method.[4] The rejuvenation of the probes significantly improved the efficiency of these systems.

Groundwater Monitoring

The COC concentrations within the groundwater plumes of Remedial Area 2 have declined significantly since implementation of the AS/SVE treatment systems. The groundwater monitoring results show that the remedy is working. There has been no identified migration of the plume within the site or off of the site.

---

[4] Over time, air sparge probes often become blocked by iron precipitation and/or silt encrustation of the probe screen. This limits the amount of air-flow moving through the probe, which in turn decreases the effectiveness of the AS/SVE system. "Hydro-shocking" is a method that was developed for rehabilitation of air sparge wells. This technique uses a tool that discharges a powder charge cartridge below the water table inside the probe. This creates a shock wave that breaks up the encrustation, ultimately clearing the probe screen.

Groundwater was sampled for lead at all sites in 2002, as recommended in the 2001 first Five-Year Review Report and in the ROD. Although lead was detected in several wells, concentrations only exceeded the action level of 15 µg/L in wells at the Central Header and Former Building 1144 sites. Based on these results, the number of wells sampled for lead was reduced and currently includes wells at the Central Header and at the Former Building 1144 sites.

Plate 6-III summarizes the results of groundwater monitoring associated with the Valve Pit A, Valve Pit B, and Valve Pit C source areas. Plate 6-IV summarizes the results of groundwater monitoring associated with the Central Header, Eight Car Header, and Former Building 1144.

Valve Pit A

There are currently nine wells sampled semi-annually (spring and fall) at Valve Pit A. During the September 2005 sampling event, only two wells, VPA-MP2 and AP-6064, had exceedences of the cleanup level for benzene. Both of these wells are located in treatment Zone 2, just to the northeast and east of the valve pit. No other COCs exceeded cleanup levels in those two wells. No COCs exceeded cleanup levels in any of the other seven wells sampled. Benzene concentrations have decreased two orders of magnitude since 1996 in these two wells, but levels have fluctuated in the past few years. Treatment at the site is currently being focused on treatment Zone 2 to continue reducing benzene concentrations in the remaining wells that exceed cleanup goals.

Valve Pit B

There are currently four wells sampled annually (in the spring) at Valve Pit B. During the April 2005 sampling event, no ROD COCs exceeded cleanup levels in any of the wells. Benzene was detected at concentrations well below its cleanup level of 5 µg/L in two wells (1.03 and 1.95 µg/L). Benzene has not been found at concentrations exceeding cleanup levels in any wells at this site since 2000. Other COCs detected at the site include ethylbenzene, toluene, 1,2,4-TMB, and 1,3,5-TMB, but the concentrations of all these contaminants were at least two orders of magnitude below their cleanup levels. Neither EDB nor DCA have ever been detected at this site.

Valve Pit C

Currently, one monitor well (VPC-MP6) is being monitored annually (in the spring) at Valve Pit C. During the April 2005 sampling effort, benzene was detected in VPC-MP6 at a concentration (5.67 µg/L) that was just above the cleanup level of 5 µg/L. Benzene concentrations in this well generally decreased between 1996 and 2001, but have remained relatively consistent at the current level since 2001. Ethylbenzene was also found in this well, but at a concentration an order of magnitude below its RAG. No other COCs were detected. Total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH)[5] both exceeded their RAGs in this well. TAH has increased in the past several years, but decreased in 2005. TAqH, which has only been calculated since 2004 when analysis of polycyclic aromatic hydrocarbons (PAHs) began at this site, have been consistently above the MCLs.

Central Header

Currently there are 13 monitoring wells associated with the Central Header area that are sampled semi-annually (spring and fall). COC concentrations have decreased significantly in all but one well (GWP-2001A) during the past 5 years. During the September 2005 sampling event, with the exception of results from GWP-2001A, benzene was the only COC detected above

[5] TAH and TAqH are calculated values established by ADEC to monitor surface water quality. TAH is equivalent to the sum total concentrations of all BTEX constituents in a given sample. TAqH is equivalent to the sum total concentration of all BTEX and PAH constituents in a given sample.

cleanup levels in any of the wells sampled. Benzene exceeded its cleanup levels of 5 µg/L in three wells: CH-MP2, GWP-80, and GWP-2001A (5.40 µg/L, 31.7 µg/L, and 1,330 µg/L, respectively). Well CH-MP2 is located in Zone 2 of the treatment system. COC concentrations in this well initially decreased when the system was started, but have rebounded and remained steady at current levels since 2004. GWP-80 is located downgradient, northwest of the treatment system. Concentrations of benzene and other contaminants have been steadily decreasing in this well since it was first sampled in 1997.

The only other COCs detected in 2005 (with the exception of COCs detected in well GWP-2001A) were EDB, ethylbenzene, toluene, 1,2,4-TMB, and 1,3,5-TMB. Toluene was detected at concentrations at least an order of magnitude below its RAG. Ethylbenzene was also found at concentrations well below its RAG. However, in upgradient well GWP-13, the concentration of ethylbenzene has generally been increasing in the past several years. Concentrations of the TMBs have been consistently low in the wells where they were detected. In 2005, TMB concentrations were at least two orders of magnitude lower than the RAG of 1,850 µg/L established in the ESD. DCA was not detected in any wells in 2005, and EDB was detected above the RAG in two wells, GWP-2001A and CHMP-2.

Well GWP-2001A is located just to the west of the truck fill stand in Zone 7 of the treatment system. Concentrations of benzene, ethylbenzene, toluene, and EDB all exceeded their RAGs by an order of magnitude or more in 2005. While concentrations of all four contaminants have decreased since the well was installed in 2001, they have generally been stable at current levels since 2003. Because concentrations have stabilized over the past few years, the remediation system does not appear to be having as significant an impact on this area as it did initially. Enhanced treatment of this area by installing additional air sparge probes using closer spacing has been proposed.

Lead sampling was initially conducted at this site in 2002. Lead was detected in 12 of the 14 wells sampled, with 8 of the wells having concentrations of lead above its action level of 15 µg/L; the highest concentration was found in well CH-MP4, at 147 µg/L. The wells with the highest concentrations of lead were located in the area closest to the suspected source of fuel contamination. In 2003, the number of wells sampled for lead was reduced to the eight with the highest 2002 results. None of the wells sampled in 2003 had lead concentrations that exceeded the action level. In subsequent years, lead concentrations have remained below the MCL in all but one well, CH-MP4, which had the highest initial lead concentration at the site. In 2005, the level of lead in CH-MP4 (107 µg/L) was still above the MCL.

Former Building 1144

A total of 11 monitoring wells are currently being sampled semi-annually (spring and fall) in the area of the Former Building 1144 treatment system. COC levels have declined significantly since 2001. During the 2005 sampling effort, only one COC, benzene, was detected at a concentration (133 µg/L) exceeding its RAG, and that was in one well, 1144-MP4, located in Zone 1 at the center of the area. Benzene concentrations in this well initially declined, but have been fluctuating since 2002 and appear to be relatively steady. No other COCs were detected above RAGs in 2005. Ethylbenzene and toluene were both detected in several wells, but the highest concentrations (127 µg/L and 156 µg/L, respectively) were well below their RAGs. Both 1,2,4-TMB and 1,3,5-TMB were detected in a majority of the wells, but all at concentrations at least an order of magnitude below the RAGs of 1,850 µg/L established in the ESD. Neither DCA nor EDB have been detected at this site since 2001.

Lead was analyzed for in all the wells sampled in 2002. Lead was detected in two wells, but exceeded the action level in only one well, GWP-91, at a concentration of 58.4 µg/L. Based on these results, lead sampling was reduced to only two wells in subsequent years. Lead continued to exceed its action level in well GWP-91 through 2003, although the concentration dropped to 30.2 µg/L. In 2004 and 2005, well GWP-91 was dry and could not be sampled. The lead concentration has not exceeded the action level in any other wells at this site.

Eight-Car Header

Currently, 13 monitoring wells are sampled at the Eight-Car Header site semi-annually (spring and fall). Concentrations of COCs have decreased significantly in all the wells since 2001. Since 2002 benzene was the only COC detected above cleanup levels. The highest COC concentrations have recently been observed in the wells upgradient of the site, where two new zones of the treatment system were installed and brought on-line in spring of 2005. Benzene was detected at a concentration (5.88 µg/L) slightly above its RAG of 5 µg/L in only one well, GWP-130, which is located in one of the upgradient treatment zones. The benzene concentration in GWP-130 has decreased by almost two orders of magnitude since 1997. Concentrations of benzene did rebound in some wells following the 2002 shut-down of the system, but have since decreased following the restart of the system in 2004.

Concentrations of COCs other than benzene are currently below RAGs in all wells, and are not detected in most wells. Ethylbenzene and toluene have both been detected in several wells, but concentrations have been consistently low for the past several years, and are generally at least an order of magnitude below the RAGs. 1,2,4-TMB and 1,3,5-TMB are also detected in many of the wells, but at one to two orders of magnitude below the RAG of 1,850 µg/L established in the ESD. Neither DCA nor EDB have been detected in any wells at the site since 2002.

Lead was analyzed for in all samples collected at the site in 2002, and was detected in 3 wells, but all at concentrations below the action level. Lead has not been sampled at this site since that time.

Institutional Controls

ICs for Remedial Area 2 are in effect, which include policies to limit excavation or well installation in potentially contaminated sites. Plate 1-I depicts the restricted use boundary. Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites.[6] This policy was last updated in 2002, but is currently under review and a new update is expected in 2006. There have been no violations of the IC policy to date. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

[6] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska ICs Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on ICs [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

Site Inspection

A site inspection was conducted by the U.S. Army Corps of Engineers on June 6, 2006 during which all six Remedial Area 2 source areas were visited. No problems were noted at any of the sites. Photographs taken at the time of the site inspection are included in Appendix C of this report.

6.4.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

The selected remedies for Remedial Area 2 are operating as intended.

AS/SVE Systems

The Remedial Area 2 AS/SVE systems were installed in 1996. Two of the systems have since been shut down and decommissioned after contaminant concentrations were reduced to acceptable levels. The remaining four systems are still operational, although the treatment areas have been significantly reduced after reaching remedial goals in portions of the sites. These systems have removed a total of 735,174 pounds of VOCs from the soil and groundwater. Results from the 2005 Monitoring Report indicate concentrations of chemicals of concern in soil and groundwater are continuing to decrease, with the exception of a few hot spots. Lead concentrations in the groundwater have decreased but still exceed MCLs in two wells, both of which are located near the middle of the site. Plates 6-III and 6-IV summarize groundwater concentrations in monitoring wells over time. All existing systems in Remedial Area 2 are determined to be operational and functional.

Implementation of Institutional Controls

ICs for Remedial Area 2 are in place. Excavation on this site is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental.

The base-wide IC policy is outlined in greater detail in the OU5 ROD, the U.S. Army Alaska ICs Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on ICs [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash – Fort Richardson, Alaska.

Table 6-8 summarizes performance to date related to the RAOs for the OU3 ROLF source area.

Table 6-8. Performance to Date of Remedial Action Objectives at OU3 ROLF

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	Contaminant concentrations are decreasing
Reduce further migration of contaminated groundwater from the source areas	There has been no growth of the plume or increase in contaminant concentrations
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)	ICs are in effect
Use natural attenuation to attain AWQS (18 AAC 70)	Source Areas are actively treated with AS/SVE systems or are being monitored

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- The remedial goals for 1,2,4-TMB and 1,3,5-TMB that were established in the ROD were base on RBCs, but were erroneously selected from the wrong column in the RBC tables. Appropriate goals for these chemicals were established in the ESD.
- The MCLs used to establish groundwater cleanup goals for Remedial Area 2 have not changed since the ROD.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances from the ROD

No variances from the ROD were identified in the review of OU3 Remedial Area 2 Source Area protectiveness and remediation process.

Recommendations

The six AS/SVE remediation systems installed at the ROLF source areas have functioned as intended. COC concentrations in the groundwater have decreased at all six sites. There are no recommendations for these sites at this time.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 6-9.

Table 6-9. Response to Recommendations from 2001 Five-Year Review

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Groundwater monitoring for lead	Analysis of lead was added to the parameter list for all monitor wells at the six ROLF sites in 2002; lead sampling is currently conducted at the Central Header and Former Building 1144 sites	U.S. Army	2002	No

6.5 Remedial Area 3 – Mileposts 2.7, 3.0, and 15.75

6.5.1 Overview

Remedial Area 3 consists of three source areas located along the FEP: Milepost 2.7, Milepost 3.0, and Milepost 15.75. The Milepost 2.7 and 3.0 sites are located in the East Birch Hill Tank Farm (EBHTF) area, as shown on Figure 6-7, and Milepost 15.75 is located near North Pole (Figure 6-8). The Milepost designations represent miles from the Fairbanks Fuel Terminal (FFT); thus, Milepost 3.0 is approximately 3.0 miles east of the FFT.

Fort Wainwright historically had two distinct pipelines that provided fuel to Ladd Army Airfield. The first pipeline was the CANOL line. The CANOL line supplied fuel to the EBHTF, FFT and fuel facilities on Fort Wainwright from approximately 1940 to 1955. The second pipeline, the Haines to Fairbanks Pipeline, was built in 1955 and operated until 1971, when the Haines-Eielson portion of the pipeline was closed and it became the FEP until 1990. The Fairbanks-Eielson pipeline route was from the Mapco refinery in the city of North Pole directly to the FFT where fuel was distributed. The section of the pipeline between Fort Wainwright and the Mapco refinery was decommissioned in 1992.

The EBHTF was constructed in 1940 to store three types of fuel for cold weather testing of aircraft and for supporting the lend-lease program. The facility consisted of 34 50,000-gallon USTs, underground piping, valve pits, and truck fill stands. High-octane gasoline, jet fuels, and diesel fuel were stored in the 12-foot-diameter, 66-foot-long steel USTs. The EBHTF consisted of three truck fill stands, three truck unloading ramps, nine main valve pits, several water separator pits, and over 30 concrete valve pits, one at each UST. Use of the facility was terminated upon construction of the Haines-Fairbanks Pipeline in 1955.

A soil gas study conducted in 1989 detected elevated levels of BTEX at Milepost 2.6 (located just to the northwest of Milepost 2.7) and subsequent investigations found contamination at Milepost 3.0. At the time of the RI and ROD, the exact cause of the contamination at these two sites was unknown. The Proposed Plan and ROD listed potential sources as breaks in the FEP, and truck fill stands, oil / water separator pits, valve pits, and pipelines associated with the abandoned EBHTF. However, an assessment of these sites was done in 2002 that determined the source of the contamination was the EBHTF and not from breaks in the FEP. This conclusion was confirmed in the ESD.

In response to remedial actions outlined in the ROD, a treatability study was initiated at Mileposts 2.7 and 3.0, which included AS/SVE and Oxygen-Releasing Compound (ORC). It was determined that this method was not effective due to low permeability of the soils in the area. A new treatability study was completed to determine the effectiveness of aboveground AS/SVE with soils removed from the Mileposts. This treatment was determined to be effective, and soils at the Milepost 2.7 and Milepost 3.0 sites were removed for *ex-situ* treatment. *In-situ* long-term groundwater monitoring continues at the actual milepost sites. The OU3 ESD documented these changes in treatment for petroleum contaminated soil and the associated increased costs.

The contamination at source area Milepost 15.75 (at the intersection of Laurance Road and Robyn Drive) was the result of a spill that occurred in August 1989, when a portion of the Fairbanks-Eielson Pipeline was ruptured during road construction. An AS/SVE system was installed and operated, and accomplished remediation of this site. This system was removed and relocated to Remedial Area1b. Long-term monitoring continues at Milepost 15.75.

Important dates and events related to the history of the FEP Milepost sites contamination and remediation are shown in Table 6-10.

Table 6-10. History of Regulatory Events at the OU3 FEP Milepost Sites[a]

Event	Date
Soil-gas survey conducted along FEP	1989
Pipeline rupture causes spill near Milepost 15.75 of FEP	August 1989
Fort Wainwright listed on NPL	August 1990
Monitoring wells installed	1991
FFA signed	1992
2-PTY signed	1992
Release Investigation at EBHTF / Milepost 3.0 added to OU3	1992
RI fieldwork conducted	September and October 1994
RI and Risk Assessment Reports submitted to EPA	October 1994
FS submitted to EPA	April 1995
ROD signed	January 1996
Air sparging treatability study conducted at Milepost 2.7 source area	1996
AS/SVE treatment system installed and begins operation at Milepost 15.75 source area	November 1996
ROD cleanup goals achieved at Milepost 15.75 source area; AS/SVE treatment system shut-down and connex removed	May 1997
ORC treatability study conducted at Milepost 3.0 source area	1997
Approximately 1,500 cy of soil removed from the Milepost 2.7 source area for *ex-situ* remediation treatability study	1998
Approximately 6,000 cy of soil removed from the Milepost 3.0 source area for *ex-situ* remediation treatability study	2000
Remainder of treatment system removed from Milepost 15.75 source area	October 2000
First Fort Wainwright Five-Year Review Report finalized	September 2001
Assessment of Milepost 2.7 and 3.0 source areas conducted	2002
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report submitted	September 2002
Fort Wainwright Construction Complete received from the EPA	2002
Milepost 2.7 and 3.0 *ex-situ* soil treatment systems decommissioned	2003
CLOSES evaluation conducted at Milepost 2.7 and Milepost 3.0 source areas	2004

[a] Information obtained from the OU3 ROD (1996); Groundwater Extraction and Treatment Effectiveness Review (Oct. 2000); OU3 ESD (2002); OU3 Interim Remedial Action Report (2002)

6.5.2 Background

Physical Characteristics

Milepost 2.7 and Milepost 3.0 Source Areas are similar in physical characteristics. Both have a moderate to steep south-facing slope to the north and a shallow, south-facing slope to the south. They are located downgradient of the EBHTF. Soils are poorly drained and ponded surface water is common from spring breakup until mid-summer. Discontinuous permafrost is typical in the areas' subsurface soil. A black spruce-scrub-shrub wetland borders the south side of the source areas while the rest of the surrounding area is densely vegetated. No endangered or threatened species reside in the area. Groundwater is encountered at depths from 3 to 12 ft-bgs and groundwater flows to the southwest.

The Milepost 15.75 Source Area is located on an off-post military fuel pipeline right-of-way within a residential area approximately 1 mile south of North Pole. The Chena River is to the north and east and the Tanana River is to the west. The site is flat except for drainage ditches that parallel Laurance Road. The drainage ditch on the south side of Laurance Road usually contains water. Soils in the area are sandy with little gravel and generally are moderately well-drained. The surrounding area is forested with trees and shrubs. Groundwater is encountered at depths from 3 to 7 ft-bgs and groundwater flows to the north.

Land and Resource Use

The Milepost 2.7 and 3.0 Source Areas are located within a military training area approximately one mile from the nearest residential development. Both areas are used recreationally. The nearest well to both source areas is located approximately one mile away at the Birch Hill Ski area. The well is not hydraulically connected to the alluvial aquifer below both source areas. The Milepost 15.75 source area is located within a residential area and wetlands occur within 0.25 miles. Future land and/or groundwater use at all three source areas are residential and recreational.

History of Contamination

The source areas at Milepost 2.7 and 3.0 were discovered as part of a 1989 soil gas survey along the active section of the FEP. Sampling locations were spaced one mile apart, and the investigation spanned 27 miles from the Fairbanks Terminal to Eielson Air Force Base. Elevated levels of BTEX were noted at Milepost 2.6 (located just to the northwest of Milepost 2.7). This investigation concluded that the contamination at Milepost 2.6 was downgradient of a truck fill stand associated with the abandoned Birch Hill USTs. Subsequent investigations of the East Birch Hill USTs encountered contamination along the base of Birch Hill near Milepost 2.7 and 3.0. The source of contamination is attributed to the EBHTF. The Birch Hill tank farm was built as part of the CANOL pipeline and stored high-octane aviation gasoline, jet fuel, and diesel fuel. There were three truck fill stands associated with the tank farm, two of them (TFS-2 and TFS-3) located adjacent to the contamination at Milepost 2.7 and 3.0 (see Figure 6-9). Numerous investigations were conducted to close out the USTs under the State of Alaska UST regulations. The State of Alaska closed the USTs, but due to extensive groundwater contamination associated with these tanks, investigation and remediation of the groundwater was added to OU3.

During the RI, surface and subsurface petroleum hydrocarbon soil contamination was identified at Milepost 2.7. Surface soil contamination was estimated to extend 120 feet south of the pipeline into adjacent wetlands and subsurface soil contamination was estimated to extend underneath Birch Hill Road adjacent to two truck fill stands. Petroleum hydrocarbons (quantified as gasoline) were detected in groundwater during the RI, and benzene was detected above the MCL.

During the RI, petroleum contamination in subsurface soils at Milepost 3.0 was found to be concentrated along Birch Hill Road. The subsurface contamination was estimated to extend northwest toward Milepost 2.7, approximately 250 feet southeast of the source area, and approximately 200 feet south of the source area under adjacent wetlands. Petroleum hydrocarbons (quantified as gasoline) were also detected in groundwater during the RI, and benzene, ethylbenzene, toluene, and EDB were each detected above the MCL.

Contamination at the Milepost 15.75 source area occurred in August 1989, when the FEP was ruptured while a contractor was upgrading Laurance Road and establishing a subgrade level for Robyn Drive, near Milepost 15.75. The pipeline was closed at nearby valves and an earthen berm was constructed to contain the spill. Approximately 2,400 gallons of the estimated 4,200 gallons of spilled fuel was recovered. Contaminated soils were removed from the spill area immediately following the recovery of liquid fuel. Elevated benzene concentrations were detected at this source area in 1992 and subsequent installation of monitoring wells revealed elevated levels of petroleum products at this area.

Pre-ROD Response

There were no pre-ROD responses for the Remedial Area 3 source areas.

6.5.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at Remedial Area 3 are associated with fuel storage, transfer, and handling activities at the East Birch Hill Underground Storage Tank Facility and the FEP.

Investigations prior to and during the RI and post-ROD sampling characterized contamination associated with Remedial Area 3 as follows:

Groundwater

Benzene, toluene, ethylbenzene, EDB, DCA, 1,2,4-TMB, and 1,3,5-TMB were detected in groundwater exceeding federal drinking water MCLs and EPA risk based concentrations used for screening potential contaminants of concern.

Soil

GRO, DRO and benzene are the contaminants found in soil at the Remedial Area 3 source areas.

Remedial Action Objectives

The remedial action objectives are the same for all source areas in OU3.

Groundwater

- Restore groundwater to drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater
- Prevent use of groundwater with contaminants at levels above Safe Drinking Water Act levels

Soil

- For petroleum-contaminated soil, prevent migration of contaminants from soil into groundwater that would result in groundwater contamination and exceedance of Safe Drinking Water Act standards

ARARs

The OU3 ROD cited the most significant ARARs for remedy selection at Remedial Area 3 to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards -- Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for OU3. There were no source specific cleanup goals for Remedial Area 3. The ROD described the point of compliance for achieving the RAOs as wells downgradient of Remedial Area 3.

Groundwater

- Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, toluene, ethylbenzene, 1,2-dibromoethane, and 1,2-DCA.
- In the ROD, the remedial goals for 1,2,4-TMB and 1,3,5-TMB were based on an RBC equivalent to a non-cancer hazard quotient of 1 using a residential groundwater exposure assumption, since there were no MCLs for these contaminants. However, the values established in the ROD were erroneously selected from the wrong column in the Region 3 RBC tables. The values listed in the ROD for these chemicals correspond to an inhalation pathway. The residential groundwater assumptions in the RI/FS correspond to a remedial goal of 1.85 mg/L for both compounds. This issue was discussed in the ESD.

Soil

- The remedial action goal for *in-situ* soil contaminated with volatile organic and petroleum compounds is protection of groundwater. Because the soils are acting as a continuing source of contamination to the groundwater, active remediation of the soils will continue until Safe Drinking Water Act levels are consistently met. Natural attenuation will continue until AWQS are achieved.
- Petroleum contaminated soils that are treated *ex-situ* will be treated to State of Alaska Matrix Level A standards before they are returned to the source area.

RAGs from the ROD and current MCLs for all chemicals of concern at OU3 are shown in Table 6-2.

Remedy Selected in the ROD

The remedy selected in the ROD for Milepost 2.7, 3.0, and 15.75 in Remedial Area 3 was soil vapor extraction and air sparging of groundwater in permafrost-free areas. This alternative was chosen because it had been proven effective with similar petroleum contamination in soil and groundwater on Fort Wainwright. The ROD also specified that long-term groundwater monitoring would be conducted at the three sites to ensure that contaminant concentrations were reduced in nearby wetlands. In addition, ICs would be maintained to restrict access to and development at the sites as long as hazardous substances remain onsite at levels that precluded unrestricted use.

6.5.4 Re-Evaluation of the ROD Remedies

Through implementation of the remedial actions in the ROD and additional historical research, the sources and volumes of contamination, groundwater movements, and geology are now better understood at the OU3 sites than they were at the time of the RI/FS and ROD. Based on this new information, a re-evaluation of the remedial actions in the ROD was conducted in 2002. The evaluation concluded that the remedies selected in the ROD for two of the sites at Remedial Area 3, Milepost 2.7 and 3.0, would not fully achieve the RAOs without significant changes to the remedial method; the selected remedy for Milepost 15.75 was determined to be suitable. An ESD document was completed in 2002 that discussed and described the recommended changes.

Basis for the Significant Differences

At the time of the ROD it was thought that the soil conditions at Remedial Area 3 would be conducive to soil vapor extraction, based on the limited information provided in the RI concerning grain size and soil moisture. However, the ROD indicated that site-specific design information would be collected in a pilot study. Based on additional sampling conducted post-ROD, it was found that the soils in both locations contained high fractions of silt and clay and were tightly bonded, thus limiting the movement of air within the vadose zone, which is necessary for effective contaminant reduction. Therefore, the selected remedial action in the ROD for this area, AS/SVE *in-situ* treatment, could not be effectively implemented. However, pilot studies conducted after the ROD showed *ex-situ* treatment of soil to be effective in meeting soil cleanup goals.

An additional finding that became apparent based on evaluations of post-ROD investigations related to the sources of contamination at the Milepost sites. The OU3 RI and ROD did not specifically identify the source of petroleum contamination. During post ROD excavation at Milepost 3.0, two out of seven samples collected from excavated soil exceeded the toxicity characteristic leaching procedure (TCLP) action level for benzene. These results could be interpreted such that a release of a hazardous waste had occurred which would be subject to regulation under RCRA. The Army evaluated existing data, conducted additional historical research for this area, and concluded that the majority of the contamination at the Milepost 2.7 and 3.0 sites is most likely upgradient of the FEP and thus is associated with the former EBHTF (FES, 2002a). Therefore, these soils fall under the exclusion allowed under 40 CFR 261.4(b)(10) and the handling of these soils is subject to the corrective action requirements of 40 CFR Part 280 for underground storage tanks. These requirements are being met through implementation of the CERCLA remedy and the ESD.

Description of Significant Differences for Remedial Area 3

The following actions/changes that were not anticipated at the time of the ROD were implemented in the ESD for Remedial Area 3 (some of these actions were completed prior to development of the ESD):

- Excavation of contaminated soils from Milepost 2.7 (1,500 cy) and Milepost 3.0 (6,000 cy) for *ex-situ* AS/SVE treatment in the vicinity of the TFS and Former Building 1173 treatment systems
- Treatment of contaminated soil from Milepost sites 2.7 and 3.0 in the treatment cells to achieve ADEC Level A cleanup levels and soil disposal criteria required for placement in Fort Wainwright's on-Post solid waste landfill or to achieve applicable off-Post soil disposal criteria, as determined appropriate by the Army
- Monitoring of soil and groundwater contamination remaining in the vicinity of Remedial Area 3, for as long as required until RAOs have been achieved, as determined by concurrence of the project managers
- Installation of additional monitoring wells and site characterization at Milepost 2.7 and 3.0 to gain a better understanding of local hydrology, impacts of permafrost, and contaminant migration

6.5.5 Status of Remediation

Soil Treatment

Milepost 2.7

An air sparging treatability study was conducted at Milepost 2.7 in 1996. The same year, a study involving ORC injected into the groundwater was evaluated. Neither of these *in-situ* technologies was considered viable for the site due to lack of electrical power and low soil permeability. Based on these studies, and pursuant to the ESD, excavation and *ex-situ* soil treatment and long-term groundwater monitoring were determined to be the most effective remedy. In 1998, approximately 1,500 cy of contaminated soil was excavated from the site. The soil was mixed with gravel (increasing the total volume to approximately 1,650 cy) and placed in a soil vapor extraction treatment cell constructed adjacent to the TFS at Remedial Area 1b (see Figure 6-10). The Remedial Area 1b TFS AS/SVE blowers were utilized to treat the petroleum-contaminated soil *ex-situ*. The system was operated seasonally from 1998 to 2002. Soil samples were collected from multiple locations and depths throughout the cell during the operational years. Sampling results showed that operation of the treatment cells effectively reduced soil contamination concentrations to below cleanup goals throughout the majority of the cell.

In 2003, the Milepost 2.7 soil treatment cell was decommissioned. The decommissioning was conducted in two phases. Phase I involved removing soil from the cell in areas where contaminant concentrations were known to be below cleanup standards, based on the previous soil sampling results. During this phase, 970 cy of soil were removed from the top and sides of the treatment cell and disposed at the Fort Wainwright landfill. During Phase II of the decommissioning, soils were screened and segregated using a photoionization detector (PID): soil with PID readings above 200 ppmV were considered to still be POL-contaminated and were stockpiled on site for later disposal; soils with PID readings below 200 ppmV were considered to be below cleanup goals and were disposed at the post landfill.[7] Of the total 1,650 cy of soil in the treatment cell, 560 cy of contaminated soil were temporarily stockpiled at the site and later hauled off-post for thermal treatment.

Milepost 3.0

A pilot study was conducted at Milepost 3.0 in 1996 involving the use of ORC injected as a slurry below the water table. Groundwater sampling results indicated injection of the ORC slurry was not effective. Based upon the results of the Milepost 2.7 treatability study for excavation and *ex-situ* treatment of soils, it was not clear if the same technology would be effective for Milepost 3.0 due to potential differences in soil or contaminant concentrations between the two sites. Therefore, in April 2000 a pilot study involving excavation and subsequent *ex-situ* soil treatment was performed at Milepost 3.0. This involved the excavation of approximately 6,000 cy of petroleum-contaminated soil. These soils were mixed with gravel and placed in an 8,000 cy treatment cell constructed at the base of Birch Hill (see Figure 6-10). The Former Building 1173 AS/SVE blowers were utilized to treat the petroleum-contaminated soil *ex-situ*. This treatment cell was operated for two field seasons, from 2000 to 2002. The main contaminants in the soils were GRO and benzene. As at the Milepost 2.7 treatment cell, soil samples were collected from multiple locations and depths throughout the cell during the operational years. Sampling results showed that operation of the treatment cells effectively reduced soil contamination concentrations to below cleanup goals throughout the majority of the cell.

The Milepost 3.0 treatment cell was decommissioned in 2003 at the same time as the Milepost 2.7 treatment cell. Due to the larger volume of soil and lower anticipated contaminant concentrations, as compared to the Milepost 2.7 treatment cell, the excavation of the Milepost 3.0 cell was conducted in a single phase. Soil was screened and segregated using a PID, but a threshold level of 100 ppmV was used to segregate the POL-contaminated soil from the soil considered to be below cleanup levels[7]. Of the total 8,000 cy of soil in the treatment cell, 1,220 cy of contaminated soil were temporarily stockpiled at the site and later hauled off-post for thermal treatment.

Milepost 15.75

An AS/SVE treatment system was installed at Milepost 15.75 site in November 1996. This site is located in a residential area in North Pole, Alaska. The treatment system operated continuously until May 1997, when initial cleanup goals had been achieved. During July 1997, the Army, EPA, and ADEC agreed to discontinue treatment and remove aboveground portions of the treatment system. In August 1997, the treatment system connex was moved back to Fort Wainwright to allow for use at another OU3 site and the underground piping and treatment system probes were removed in October 2000.

---

[7] A correlation study was conducted for the "Milepost 2.7 and 3.0 Treatment Cell Decommissioning and Sampling Plan" (FES, 2003) that compared historical soil sampling results with the corresponding PID readings. Over 300 sample results and PID readings were compared, and a strong positive correlation was found. Two different PID responses (100 ppmv and 200 ppmv) were used for the two different treatment cells because the soils were contaminated with different types of fuel. The Milepost 3.0 soils were primarily contaminated with gasoline, while the Milepost 2.7 soils were primarily contaminated with heavier fuel types (such as diesel). Therefore, a PID response of 100 ppmv reasonably represented the soil cleanup level for the Milepost 3.0 treatment cell, while a PID response of 200 ppmv correlated better to the cleanup levels for the Milepost 2.7 treatment cell.

Groundwater Monitoring

Milepost 2.7

Groundwater monitoring is conducted annually at Milepost 2.7 to evaluate the progress towards achieving RAOs. The sampling program currently includes ten monitor wells that are sampled annually, in the fall[8]. Sampling was conducted semi-annually until 2005 when the decision was made to change the frequency to the current annual sampling program. Plate 6-V summarizes the results of groundwater monitoring associated with the Milepost 2.7 source area.

The results of the 2005 sampling event indicated that benzene was the primary contaminant of concern in the groundwater at this site. Benzene exceeded cleanup levels in all seven of the wells sampled, with levels ranging from 8.76 µg/L (in well AP-5651, upgradient of the site) to 3,170 µg/L (in well AP-9084, just downgradient). Benzene concentrations have increased considerably (from 134 µg/L to 455 µg/L) in well AP-6036 (upgradient of the excavation) since 2003, but appear to be stable in other wells.

Other COCs detected at the site during 2005 included ethylbenzene, toluene, EDB, and 1,2,4-TMB and 1,3,5-TMB. Ethylbenzene and toluene were found in all seven wells, but only toluene exceeded the RAG in one well, AP-9084. EDB also exceeded the RAG in this well, but was not detected in any of the other wells. 1,2,4-TMB and 1,3,5-TMB were both found in all seven wells, but at concentrations at least an order of magnitude below their MCLs. DCA was not detected in any of the wells.

Significant decreases in benzene concentrations have been observed within and downgradient of the 1998 excavation area, indicating that source removal was effective in reducing groundwater contamination. However, contaminant concentrations in groundwater beneath the site appear to have rebounded in some wells, but have generally stabilized in the past few years. Although there is an apparent seasonal fluctuation in concentrations in some wells, this is likely due to the seasonal nature of the aquifer[9]. Groundwater flow at this site is also complicated due to the presence of permafrost, varying soil permeability, and the steep topography of the hill. A geophysical study conducted in 2005 indicated that massive permafrost is present to an unknown depth in the areas directly downgradient of the site. Both the presence of permafrost and the low permeability of the native soil in the area are assumed to inhibit groundwater flow and the migration of contaminants away from the site.

Milepost 3.0

The sampling program at Milepost 3.0 currently includes 12 monitor wells that are sampled annually during the fall, at the same time as the Milepost 2.7 monitoring[10]. Sampling had been conducted semi-annually until 2005 when the decision was made to change the frequency to the current annual sampling program. Plate 6-V summarizes the results of groundwater monitoring associated with the Milepost 3.0 source area.

Benzene and EDB were the only COCs found exceeding cleanup levels at this site during 2005. Benzene exceeded cleanup levels in seven wells, with the highest concentration (1,650 µg/L) in well AP-6040, located at the site of the excavation. EDB exceeded cleanup levels in six of the

---

[8] Some wells at this site tend to be frozen or dry at the time of sampling and therefore cannot be sampled. In 2005, only seven of the ten wells were sampled because wells AP-8708, AP-8709, and AP-8710 were dry.

[9] Groundwater flow in this area is significantly affected by freezing in the winter, resulting in lower recharge to the aquifer, and thawing in the spring resulting in higher recharge to the aquifer.

[10] As at Milepost 2.7, some wells at this site also tend to be frozen or dry at the time of sampling and therefore cannot be sampled. In 2005, only 10 of the 12 wells were sampled because wells AP-7822 and AP-8713 were dry.

wells, with the highest concentration (4.83 µg/L) in well AP-8711, located cross-gradient from the excavation. Three new downgradient wells were installed in 2004. Benzene was not detected in either of the two farthest downgradient wells (AP-9078 and AP-9079) during 2005, but EDB exceeded its cleanup level in AP-9079, the farthest downgradient well. Overall, benzene levels decreased significantly in the wells around the excavation following the soil removal in 2000, but have been increasing in these wells in the past few years. In downgradient wells, benzene concentrations have been fluctuating and there is no clear trend.

Other COCs that were detected in groundwater at the site in 2005 include ethylbenzene, toluene, 1,2,4-TMB, and 1,3,5-TMB. Each of these compounds was found in several wells, but at concentrations at least an order of magnitude below their respective cleanup levels. DCA was not detected in any wells in 2005.

Hydrogeologic conditions at Milepost 3.0 are very similar to Milepost 2.7. Groundwater flow is complicated by the presence of permafrost and low permeability native soils. These conditions both tend to moderate groundwater flow and inhibit the migration of contaminants from the site.

Milepost 15.75

The concentrations of contaminants in the identified plume at Milepost 15.75 have declined to below detection levels in all wells. Sampling had been conducted annually until 2002 when a three-year monitoring schedule was implemented. All three wells were sampled in 2005. No COCs were detected in any wells during the 2005 sampling effort. Benzene is the only COC that has historically been found at this site above its cleanup level, but it has not been detected in any wells since 2001. No other COCs have been detected in any wells since 2000. Figure 6-11 summarizes the results of groundwater monitoring associated with the Milepost 15.75 source area.

Institutional Controls

ICs for the Milepost 2.7 and Milepost 3.0 are in effect at Remedial Area 3 and include policies to limit excavation or well installation in potentially contaminated sites. There have been no violations of the ICs to date. Plate 1-I shows the boundary of the area at these sites in which intrusive activities are restricted.

Fort Wainwright has established a post wide IC policy for all known or suspected contaminated sites.[11] This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude

[11] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska ICs Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on ICs [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Site Inspection

A site inspection of the Milepost 2.7 and 3.0 sites was conducted by the U.S. Army Corps of Engineers on June 6, 2006; the Milepost 15.75 site was not visited. Frost-jacking[12] was observed at several wells. This is an on-going problem with wells at these sites. Three wells that have frost jacked were also noted in the 2005 Annual Report and recommended for replacement. No other problems or issues were observed at either site. Photographs from the site visit are provided in Appendix C.

6.5.6 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Milepost 2.7

A treatability study conducted at the Milepost 2.7 source area during 1996 showed that air sparging was not a viable alternative for this source area. A second treatability study initiated in 1998 at Milepost 2.7 showed that it was feasible to use *ex-situ* soil treatment to achieve remedial objectives in petroleum soils.

Although concentrations of benzene remain high, the results of the 2005 Comprehensive Monitoring Report indicate that, with the exception of well AP-6036, there have been no significant changes in groundwater concentrations for the past few years. Flow of groundwater at this site is complicated by several hydrogeologic factors that appear to be inhibiting the migration of contaminants away from the site. A site survey conducted in 2004 found that there is no indication that groundwater contamination is having a negative impact on any surface water or vegetation downslope or downgradient of the site.

Because of the complex hydrogeology, and based on the observed contaminant trends, it is unclear if groundwater cleanup goals can be achieved for this area within a reasonable period of time.

Milepost 3.0

A treatability study conducted at the Milepost 2.7 source area during 1996 showed that air sparging was not a viable alternative for the Milepost 2.7 source area. Since the soils at Milepost 3.0 are similar to those at Milepost 2.7, *in-situ* air sparging was determined to be ineffective at the Milepost 3.0 site as well. A second treatability study initiated in 1998 at Milepost 2.7 showed that it was feasible to use *ex-situ* soil treatment to achieve remedial objectives.

Benzene concentrations remain high at this site and have shown some increase in areas near the 2000 excavation. However concentrations in downgradient wells have been relatively stable, and appear to decrease with distance from the excavated area. As at Milepost 2.7, flow of groundwater at this site is complicated by several hydrogeologic factors that appear to be inhibiting the migration of contaminants away from the site. A site survey conducted in 2004 found that there is no indication that groundwater contamination is having a negative impact on any surface water or vegetation downslope or downgradient of the site.

[12] Frost-jacking is a process that essentially pushes a well up out of the ground. It is caused by the repeated freezing and thawing of frost susceptible soil around the well.

Because of the complex hydrogeology, and based on the observed contaminant trends, it is unclear if groundwater cleanup goals can be achieved for this area within a reasonable period of time.

Milepost 15.75

No COCs have been detected at the Milepost 15.75 site since 2001. Benzene is the only COC that has been historically identified above ROD remediation goals or AWQS at this site. Benzene concentrations have decreased across the site from a high of 300 μg/L in 1996, to non-detect in any wells since 2001. These results show that the treatment system was effective in reducing the contamination at the site and that the remaining contamination has naturally attenuated such that it is no longer a threat to human health or the environment. Additional monitoring is not necessary at this site and the site is recommended for NFA.

Implementation of Institutional Controls

ICs for Milepost 2.7 and 3.0 at Remedial Area 3 are in place. Excavation in the active area is restricted and requires authorization by DPW Environmental. Groundwater intrusion is restricted, subject to authorization by DPW Environmental.

Table 6-11 summarizes performance to date related to the RAOs for the OU3 FEP Milepost source areas.

Table 6-11. Performance to Date of Remedial Action Objectives at OU3 FEP Milepost Sites

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	• Contaminant concentrations are relatively constant at Milepost 2.7 and 3.0 • Concentrations have all decreased to below detection limits at Milepost 15.75
Reduce further migration of contaminated groundwater from the source areas	• Contaminants do not appear to be migrating off site at Milepost 2.7 and 3.0 • Concentrations have all decreased to below detection limits at Milepost 15.75
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)	• ICs are in effect. No violations of ICs.
Use natural attenuation to attain AWQS (18 AAC 70)	• Contaminant concentrations are relatively constant at Milepost 2.7 and 3.0, and do not appear to be migrating from the site • All COC concentrations have decreased to below detection limits at Milepost 15.75

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- The remedial goals for 1,2,4-TMB and 1,3,5-TMB were established in the ROD base on RBCs, but were erroneously selected from the wrong column in the RBC tables. Appropriate goals for these chemicals were established in the ESD.
- The MCLs used to establish groundwater cleanup goals for Remedial Area 3 have not substantively changed since the ROD.
- *In-situ* AS/SVE was determined not to be feasible at Milepost 2.7 and 3.0.

The selected remedy of *in-situ* soil remediation at Milepost 2.7 and Milepost 3.0, as outlined in the original ROD, was modified in the ESD. The remedy proposed in the ESD was excavation of contaminated soil for *ex-situ* AS/SVE treatment. Treatability studies conducted at each of these sites found *ex-situ* AS/SVE treatment to be successful in treating the excavated soils. Groundwater monitoring determined that excavation and *ex-situ* treatment of contaminated soils was initially successful in decreasing contaminant concentrations in the groundwater at the two sites. Although concentrations have since rebounded, they have generally stabilized, and the current site model indicates that no migration of contaminants off-site is occurring.

The ESD also recommended expanding the groundwater monitoring network at each site and conducting additional investigations to construct a more comprehensive site model; both of these actions were completed.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances

Variances with the ROD for OU3 Remedial Area 3 were described and discussed in the ESD. No variances have been identified for the OU3 Remedial Area 3 source area protectiveness and remediation process since the ESD.

Recommendations and Follow-up Actions

At the Milepost 2.7 and 3.0 sites, excavation and *ex-situ* treatment of contaminated soils was shown to be partially successful. While the *ex-situ* treatment was effective in remediating the contaminated soils, the soil removal did not significantly diminish groundwater contamination several years following the excavation at either site. Based on these results, additional excavation and *ex-situ* soil treatment is not expected to be an effective method for meeting the site RAOs and is therefore not recommended. Because of the complex hydrogeology in these areas and observed contaminant trends, it is unclear if any reasonable remedial action could achieve groundwater cleanup goals for these areas within a reasonable period of time. However, the current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness. Groundwater is currently monitored annually at these sites. The RPMs will continue to evaluate the data from these sites and determine if it is appropriate to pursue a Technical Impracticability of Groundwater Restoration Waiver, as is being done for the Tank Farm.

At the Milepost 15.75 site, soil treatment was successful and the ROD RAOs have been met. Groundwater monitoring is no longer necessary and this site should be closed.

Table 6-12. Recommendations and Follow-Up Actions for OU3 FEP Milepost Sites

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Milepost 15.75 should be considered for NFA	U.S. Army	EPA / ADEC	2007	No

7 OPERABLE UNIT 4

7.1 OU4 Background

Operable Unit 4 (OU4) was the second Fort Wainwright OU to reach a final-action ROD. That ROD was signed in August 1996 and initially addressed three source areas: the Landfill, the Coal Storage Yard (CSY) and the Fire Training Pits (FTPs). The list of OU4 source areas and their status is shown in Appendix F. The ROD specified remedial actions subject to Five-Year Review at two of these areas: the Landfill and the CSY.

The OU4 ROD found that removal of contaminated soils at the FTPs would adequately protect human health and the environment from potential risk associated with those source areas. Contamination of concern at the FTPs was limited to localized petroleum hydrocarbon "hot spots" in surface and shallow subsurface soils, and there was no reported contamination above action levels in groundwater at the FTPs. The ROD anticipated that the soil removal action would constitute final action for the FTPs. As such, no analysis of remedial alternatives was included in the OU4 ROD, and no additional remedial actions were indicated. The Army decision document for soil removal at the FTPs was included in the ROD as Appendix A and stated "Because this remedy will not result in hazardous substances remaining on-site above levels that allow for unrestricted use and unlimited exposure, the Five-Year Review will not apply to this action." The Army completed soil removal at the FTPs in September 1996.[1]

7.2 OU4 – Landfill

7.2.1 Overview

The Landfill source area (the inactive portion of the landfill) covers approximately 14 acres and is located immediately to the south of Fort Wainwright's active landfill, north of River Road (Figure 7-1). Gravel excavation began in this area as early as 1944, and landfill operations reportedly began in the 1950s.[2] Unsegregated waste was disposed in the gravel pits and then burned. After the pits were filled with burned debris, they were covered. The OU4 ROD, signed in September 1996, specified a phased approach to remediation of the Landfill source area:

1. Capping the inactive portion of the Landfill, along with natural attenuation, monitoring of groundwater, and ICs; the cap was completed in September 1997 and is inspected for integrity at least once a year.

2. Evaluation of potential groundwater treatment, if levels of contamination in groundwater were found to increase; this has not been shown, to date.

Early site investigations confirmed groundwater contamination at the Landfill, which was one of two contaminated sites that resulted in Fort Wainwright's being placed on the NPL.

---

[1] Site Assessment Report, Remove Soil at Burn Pits, Fort Wainwright, Alaska, Rockwell Environmental Services, January 21, 1997.

[2] There are no historical records documenting the starting date of landfill operations.

Periods of use and dates related to the history of the Landfill source area contamination and remediation are summarized in Table 7-1.

Table 7-1. History of Regulatory Events at OU4 Landfill[a]

Event	Date
Landfill activities begin	Early 1950s
Soil and groundwater study conducted	1990
Fort Wainwright NPL listed	August 1990
Groundwater monitoring performed	1991 and 1992
FFA signed	1992
2-PTY signed	1992
RI conducted	1993 and 1994
ROD signed	August 1996
Landfill Project Site Plan completed	July 1997
Cap constructed over inactive portion of landfill	1997
RAR finalized	March 1999
OM&M issued	January 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002

[a] Information compiled from the OU4 ROD; OU4 Landfill OM&M; and the Five-Year Review Report Document Log.

7.2.2 Background

Physical Characteristics

The Landfill is located north of the Chena River at the base of Birch Hill. It encompasses 60 acres, approximately 40 acres north of River Road and a 20-acre area immediately south of River Road (the former trench area). Wetlands border the Landfill to the north and east, and black spruce forest borders the remainder of the source area except in areas cleared for access to the Landfill along River Road. The source area is in a 500-year floodplain. No endangered or threatened species reside in the area.

The Landfill is surrounded by discontinuous permafrost and is a part of a complex hydraulic regime. In the vicinity of the Landfill, groundwater in the shallow aquifer zone generally flows southwest towards the Chena River, while groundwater in the deep aquifer zone generally flows in the north-northwesterly direction of the regional gradient. However, flow direction and gradient is subject to seasonal variations and may be interrupted or redirected by permafrost in some locations. Depth to groundwater in the vicinity of the landfill is approximately 15 to 20 ft-bgs.

The Landfill itself is believed to be in a permafrost-free "thaw bulb", with thaw channels that have been identified as important pathways for contaminant transport from the Landfill towards the Chena River. Post-RI monitoring data supports the premise that the southwest thaw channel is the primary contaminant migration route from the Landfill to downgradient groundwater.

Land and Resource Use

The older southwest portion of the Landfill and the former trench area are inactive. The remaining portion in the cleared area north of River Road is currently an active inert waste landfill, accepting construction and demolition debris. The previous landfill permit allowed the disposal of domestic and commercial refuse, ash, asbestos, incinerator residue, bagged human waste, and construction or demolition waste.

The active portion of the landfill currently operates under ADEC Solid Waste Permit No. 0131-BA003, a renewal of the previous permit number 9831-BA003. The current permit was issued in August 2001, and incorporates state and federal solid waste regulations. Under this permit, the Fort Wainwright landfill is an unlined Class I Solid Waste Facility.

Because the current operating permit does not permit the disposal of polluted soils in the landfill, a permit modification is pending for the inclusion of the cell for disposal of phytoremediation soils (discussed in Section 4.3). The permit application is expected to be submitted this year.

The active portion of the landfill has not been closed in the last five years, as was indicated in the 2001 Five-Year Review. It has remained open to accommodate construction debris from the numerous construction projects associated with the assignment of the Stryker Brigade at Fort Wainwright. The pending landfill permit will provide an additional five years of operation for the landfill. After that time, use of the landfill and the decision of whether or not to close it will be evaluated based on future operations at Fort Wainwright.

At the time of the ROD signature, there was concern that groundwater contaminated by the landfill could enter the Chena River (located approximately 1,500 feet from the landfill) or threaten downgradient users, including residents of the City of Fairbanks (the base boundary is slightly over 1 mile downgradient of the landfill). However, monitoring data does not indicate off-site migration of groundwater contaminants from the landfill source area. Future land use is industrial. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

History of Contamination

Landfill activities began in the early 1950s. Based on historical aerial photographs, waste was initially dumped into gravel pits, burned, and covered. The Landfill began receiving most wastes generated at the Post in the 1950s. In the early 1960s, trenching and burning ceased and wastes were spread, compacted by bulldozer, and covered with coal ash generated from the Fort Wainwright power plant. Wastes that may have been disposed of at the Landfill in the 1950s include human waste, household refuse, waste POLs, hazardous waste, solvents, pesticides, asbestos, construction debris, and inert munitions. Historically, the quantity and type of waste disposed of at the Landfill were not documented.

Previous investigations have identified other suspected wastes that may have been disposed at the landfill as: dry-cleaning waste and filters (reportedly redistilled prior to disposal to remove PCE); vehicular paint; asbestos; small arms and explosives; triple-rinsed punctured and crushed pesticide cans, rags, and soil from small pesticide spills of less than one gallon; empty drums; and paint debris.

Pre-ROD Response

A well-defined area of petroleum hydrocarbon and lead contaminated surface soil in the inactive portion of the Landfill was permanently covered with approximately 8 feet of construction debris and native soils prior to the OU4 ROD. The covering of the spill eliminated the dermal exposure pathway for the lead.

7.2.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at the Landfill are wastes that were placed in the Landfill and coal ash from the power plant that was used as a cover material at the landfill. Initial investigations confirmed that transport of Landfill contaminants, including coal ash, through surface runoff from the Landfill to downgradient surface water was insignificant. Groundwater contamination was caused by the creation of leachate, through percolation and infiltration of surface water (i.e., rainwater or snowmelt) through Landfill waste.

Investigations prior to and during the RI characterized contamination associated with the Landfill.

Groundwater

Volatile and semivolatile organic compounds were detected in groundwater under the Landfill and in the downgradient southwest transport pathway in concentrations exceeding federal drinking water MCLs and EPA RBCs used for screening potential contaminants of concern.

Concentrations of two metals (lead and chromium) exceeded MCLs or RBCs but were less than background levels. Concentrations of two other metals (arsenic and manganese) exceeded MCLs or RBCs and background levels for the site but were judged to fall within the range of naturally occurring concentrations for the area.

Soil

Petroleum hydrocarbons and lead, from a spill, were reported at one surface soil location of the inactive landfill. That area was permanently covered prior to the ROD.

Remedial Action Objectives

All of the RAOs for the Landfill source area pertain to groundwater quality:

Groundwater

- Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater from the source areas
- Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)
- Use natural attenuation to attain AWQS (18 AAC 70)

ARARs

The OU4 ROD cited the most significant ARARs for remedy selection at both the Landfill and the CSY to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, COCs were identified for establishing numeric cleanup goals for the Landfill as discussed below. Cleanup goals for COCs at the OU4 Landfill are shown in Table 7-2.

Table 7-2. Cleanup Levels for Chemicals of Concern at OU4 Landfill

Media	Chemical of Concern	ROD Cleanup Level	Basis	Current Cleanup Levels[a]
Groundwater	Benzene	5 μg/L	MCL	5 μg/L
	Bis(2-ethylhexyl)phthalate	6 μg/L	MCL	6 μg/L
	cis-1,2-DCE	70 μg/L	MCL	70 μg/L
	1,1,2,2-Tetrachloroethane	5.2 μg/L	EPA RBC[b]	4[c] μg/L
	1,1,2-Trichoroethane	5 μg/L	MCL	5 μg/L
	TCE	5 μg/L	MCL	5 μg/L
	Vinyl chloride	2 μg/L	MCL	2 μg/L

[a] MCLs from NPDWR and/or 18 AAC 75 Table C for groundwater.
[b] Groundwater remediation goal based on EPA Region 3 RBCs.
[c] Cleanup level from 18 AAC 75 Table C; no federal MCL has been established for this chemical.

Groundwater

Seven chemicals of concern were established for groundwater in the ROD: benzene, cis-1,2-DCE, 1,1,2,2-tetrachloroethane (PCA), 1,1,2-trichloroethane (TCA), TCE, vinyl chloride, and bis(2-ethylhexyl)phthalate. When available, Federal and State of Alaska drinking water MCLs were adopted as the groundwater cleanup goals. At the time of the ROD, MCLs were available and used for all but one of the COCs: 1,1,2,2-PCA. Since there were no MCLs for this chemical, the cleanup level in the ROD was based on the EPA Region 3 RBC. However, since the ROD was finalized, a groundwater cleanup level for 1,1,2,2-PCA has been instituted by the ADEC. As shown in Table 7-2, the MCLs for benzene, cis-1,2-DCE, 1,1,2,2-PCA, 1,1,2-TCA, TCE, vinyl chloride, and bis(2-ethylhexyl) phthalate have not changed, while the new MCL for 1,1,2,2-PCA is slightly lower than the risk-based levels adopted in the ROD.

Soil

No numeric cleanup levels were established for soil at the Landfill source area in the ROD.

Selected Remedy

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water aquifer. The ROD describes the point of compliance for achieving the RAOs as wells downgradient of the Landfill.

Landfill Cap

- Cap the approximately 8-acre inactive portion of the landfill[3] with a minimum of 2 feet of native soil, compacting to achieve a permeability no greater than 10^{-5} cm/sec
- Vegetate the cap with native plants
- Promote drainage to prevent ponding and erosion

Natural Attenuation and Groundwater Monitoring

- Achieve the RAOs for this source area through natural attenuation. Site modeling estimated that natural attenuation would take 70 years in order to achieve RAOs.
- Monitor groundwater downgradient of the Landfill and evaluate results to determine the effectiveness of the capping and natural attenuation with respect to cleanup goals.

Contingent Remedy

- A methane gas collection system was not anticipated, but the ROD specified that the need for a gas collection system would be considered during remedial design. The landfill cap remedial design did not include a methane gas collection system.
- The ROD specified that if natural attenuation of groundwater did not progress as projected, or did not result in a significant reduction in leachate, an active groundwater treatment system would be considered.

Institutional Controls

- Maintaining ICs restricting access to and development at the site as long as hazardous substances remain onsite at levels that precluded unrestricted use.

7.2.4 Status of Remediation

Landfill Cap

In 1996, the U.S. Army Corps of Engineers contracted design of the cap system for the inactive portion of the Landfill. The cap was constructed in 1997. The landfill cap was constructed over the inactive portion of the landfill north of River Road. This area encompasses approximately 14 acres[3]. The trench area south of River Road was not included in the capping project

[3] The ROD initially determined that 8 acres would need to be capped, but during the design phase of the project, the area to be capped was determined to be 14 acres.

because no contaminants were found in soils at levels that posed an unacceptable risk to human health or the environment in this location.

The landfill cap is an earthen cap design that includes multiple layers of soil. The layers within the cap include:

- Unclassified subgrade material (6-inches thick) which provided a uniform base for the remainder of the cap. Unclassified material is defined as any inorganic soil, free of trash, peat, debris, or frozen clods which is capable of being compacted as required by the design plans.

- Low permeability soil layer (18-inches thick) which limits infiltration through the cap. The low permeability material is defined as a silt or clay (100 percent passing the No. 4 screen and 80 percent passing the No. 200 screen) which can be compacted to achieve a maximum permeability of 5×10^{-5} cm/sec.

- Drainage layer (6-inches thick) intended to minimize ponding of water on the surface of the low permeability soil layer. The drainage layer material is a sand (100 percent passing the No. 4 screen and 5 percent passing the No. 200 screen).

- A woven geotextile between the topsoil and drainage layer to minimize migration of fines between the two layers.

- Top soil that is at least 6-inches thick.

- Surface vegetation -- The cap was seeded with a mixture of grass and wildflower.

The landfill cap is a passive remedial alternative intended to reduce surface water infiltration into the landfill and consequently reduce leachate migration to groundwater. The system has no active operational requirements. Monitoring and maintenance of the landfill cap includes:

- Semi-annual groundwater monitoring (spring and fall)

- Annual inspection of the cap integrity

Groundwater Monitoring

Ten monitoring wells are currently sampled, semi-annually (spring and fall), at the Landfill. Although a few of the wells have been replaced in the past few years, the replacement wells were installed in the same general locations and at the same depth as the original wells, so the continuity of the monitoring network has remained intact. Because of the presence of discontinuous permafrost in this area, wells have been screened at various depths to monitor the shallow aquifer (above the permafrost, or supra-permafrost), the intermediate aquifer, and the deep aquifer (below the permafrost, or sub-permafrost). Five wells are considered to be shallow and screened above the permafrost (AP-5588, AP-6132, AP-8061, AP-9076, and FW-LF4); three wells monitor the intermediate zone (AP-5589, AP-6136, and AP-6138); and, two wells are screened below the permafrost (AP-8063 and DH-6534). Although there are no stratigraphic confining layers separating these zones, discontinuous permafrost in the monitored area blocks horizontal flow in some areas and complicates flow patterns.

Groundwater flow directions and gradients are difficult to determine with accuracy in this area due to the influences of the permafrost, the different zones of the aquifer, and because there are only a few wells screened in each zone. Water level measurements have indicated that the flow in the shallow and intermediate aquifer zones generally follow the regional gradient to the west, although the gradient is quite flat.

Five COCs (benzene, cis-1,2-DCE, 1,1,2,2-PCA, 1,1,2,-TCA, and TCE) have consistently been detected above their MCLs in one or more wells located downgradient of the Landfill. COC concentrations have generally remained stable in these wells for the past several years.

Plate 7-I shows the groundwater concentrations for all the wells since monitoring began in 1997.

Concentrations of four COCs have historically been highest in the shallow wells closest to the Landfill, and decrease with distance from the landfill: cis-1,2-DCE; 1,1,2,2-PCA; 1,1,2,-TCA; and TCE. The well with the highest concentrations of all four COCs, AP-5588, is located immediately downgradient of the Landfill. COC concentrations in this well have shown some minor fluctuations from year to year, but have generally been stable over the length of the monitoring program. Other wells in which one or more of these four COCs have been detected at concentrations exceeding MCLs include AP-8061 and AP-8063. In both wells, COC concentrations have been stable at concentrations often an order of magnitude lower than in AP-5588. None of these four COCs have ever been detected at levels exceeding MCLs in the furthest downgradient well, DH-6534, although cis-1,2-DCE has been detected at a low concentration (3.8 µg/L) in the past two years.

Benzene has consistently been detected in several wells, but at concentrations of about 2 to 3 µg/L, below the MCL of 5 µg/L. Benzene has exceeded its MCL in only two wells at the site, AP-8061 (which replaced well AP-6137) and DH-6534 (the farthest downgradient deep well). Benzene concentrations in AP-8061 have been relatively stable and have shown a distinct seasonal fluctuation, between 2.5 and 5.8 µg/L, in the past 5 years. In well DH-6534, the concentration of benzene was below the MCL in all sampling events between 1997 and 2004 when it suddenly increased to 8.1 µg/L during the spring 2004 sampling event. It decreased to below the MCL in the fall of 2004, but was at concentrations of approximately 8 µg/L during both 2005 sampling events.

The other two COCs, bis-(2ethylhexyl)phthalate and vinyl chloride, have been detected less consistently at this site. Vinyl chloride has only exceeded its MCL on three occasions, in wells AP-5589 and AP-8063, and with the highest concentration (2.6 µg/L) being just above its MCL of 2 µg/L. Bis(2-ethylhexyl)phthalate has been detected in several wells, but concentrations have tended to be quite variable and have often been qualified by the laboratory as being estimated and/or questionable due to the analyte having been detected in the blank as well as in the sample. Neither of these contaminants exceeded MCLs in any samples from fall 2005.

Only one COC, bis(2-ethylhexyl)phthalate has been detected above its MCL in a well located upgradient of the landfill. Bis(2-ethylhexyl)phthalate exceeded it MCL twice in well FWLF-4, but has not been detected since 2003. Benzene and cis-1,2-DCE have both been detected in this well in the past few years, but at levels below their MCL.

In general, the groundwater results indicate that contaminants migrating from the landfill are being naturally attenuated. Although benzene has been detected above its MCL in the farthest downgradient well, concentrations have been stable for the past two years.

Institutional Controls

ICs for the Landfill are in effect and include fencing and signage to limit access to the site, and policies to restrict excavation or well installation in potentially contaminated sites. Plate 1-I depicts the restricted areas.[4]

---

[4] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Site Inspection

This site was inspected by the U.S. Army Corps of Engineers on June 6th, 2006. The landfill cap and fence were observed to be in good condition with no evidence of drainage problems or loss of integrity of the landfill cap. Photographs taken at the time of the site inspection are included Appendix C of this report.

7.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Landfill Cap

The Landfill cap was constructed in 1997 and is maintained as necessary and inspected annually. Groundwater monitoring results indicate that the contaminant plume is not migrating away from the site area. Results from the fall 2005 sampling event indicate no significant increases in concentrations for the target analytes in the past five years. During ROD preparation, the possibility was anticipated that capping the landfill may not significantly decrease contaminant concentrations in groundwater and capping the entire landfill might be necessary. Although contaminant concentrations have not decreased in the past five years, neither have they increased but appear to be stable, and ICs remain protective of human health and the environment.

Plate 7-I summarizes the results of groundwater monitoring associated with this source area.

Implementation of Institutional Controls

ICs for the Landfill are in place. Excavation in the active area is restricted and requires authorization by DPW Environmental. Absolutely no excavations are allowed in the inactive landfill area. Groundwater intrusion is restricted, subject to authorization by DPW Environmental. The ICs do not extend to the area downgradient of the Landfill where groundwater monitoring and natural attenuation is occurring. Enlarging the zone of IC coverage to include the downgradient area would preclude any possibility of groundwater in this area accidentally being used as a source of drinking water.

System Operations / O&M

The landfill cap is inspected annually; there have been no reported problems with the landfill cap in the past 5 years.

Table 7-3 summarizes the performance to date related to the RAOs for the OU4 Landfill source area.

Table 7-3. Performance to Date of Remedial Action Objectives at OU4 Landfill

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	Contaminant concentrations have stabilized in 9 years since cap constructed
Reduce further migration of contaminated groundwater from the source areas	No growth of plume, contaminant concentrations remain stable
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)	ICs in effect
Use natural attenuation to attain AWQS (18 AAC 70)	Contaminant concentrations have stabilized in 9 years since cap constructed

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The model of permafrost distribution and groundwater flow in the area around the Landfill has been refined since the last Five-Year Review (Cold Regions Research and Engineering Laboratory, 2003), but no changes to the monitoring network have been required.
- It was assumed that the active portion of the Landfill may affect downgradient concentrations of contaminants and significant decreases in contaminant concentrations may not occur until the entire Landfill is closed and capped. Groundwater monitoring data to date support this assumption.
- There are no known changes in exposure pathways or populations at risk.
- There have been no changes in the MCLs for benzene, bis(2-ethylhexyl)phthalate, cis-1,2-DCE, 1,1,2,-TCA, TCE, or vinyl chloride.
- The State of Alaska has established groundwater cleanup goals for 1,1,2,2-PCA, although there is still no federal MCL (this chemical is on the federal Drinking Water Contaminant Candidate List).

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances

Table 7-4 shows the variances identified in the review of OU4 Landfill Source Area protectiveness and remediation process.

Table 7-4. Variances from the ROD since 2001 at the OU4 Landfill

Variances	Currently Affects Protectiveness (Yes/No)
The State of Alaska has established a groundwater cleanup level for 1,1,2,2-PCA	No

Recommendations and Follow-up Actions

No landfill cap design or operational changes are recommended at this time. The following variances were identified in the review of OU4 Landfill Source Area groundwater monitoring program and ICs.

The remedy selected for the Landfill includes groundwater monitoring. In order to be protective, the monitoring wells must be located downgradient of the Landfill. Groundwater flow is complex and varied due to the presence of permafrost in the Landfill area. The groundwater flow system in the Landfill area may be sensitive to changes in the hydrologic system. Changes can be caused by natural occurrences such as increases or decreases in average annual precipitation or by human disturbances such as capping of the Landfill. It is important to evaluate the groundwater monitoring data while keeping these potential effects in mind especially while assessing wells that are located downgradient of the source area.

The 2001 Five-Year Review recommended that groundwater contours be plotted and evaluated during each monitoring event to assess groundwater flow patterns and ensure that the well placement relative to the source area remains appropriate. Groundwater elevations are collected and divided into three groups according to screen elevation. Comparison of elevations from shallow wells (AP-6132, FW-LF-4, AP-5588 and AP-8061) has shown a flat gradient, but overall indicates that groundwater flow in permafrost-free areas is consistent with regional flow. Because of the possible effect that the presence of permafrost has on water levels at this site, it may not be appropriate to continue tying all the wells in the monitoring network together. Since there are only two deep wells in the monitoring network, there is not enough information to map flow data from the sub-permafrost area. While it is important to continue collecting and interpreting the groundwater elevation data, it is not recommended to continue mapping the flow patterns based on all the wells in the monitoring network.

Analytical data from the groundwater monitoring program should be evaluated as it is reported to assure no off-site migration of contaminants occurs and to evaluate the progress of natural attenuation.

Although the State of Alaska has established a groundwater cleanup goal for 1,1,2,2-PCA, there is still no federal MCL for this chemical. Because the State of Alaska MCL (4 µg/L) is very similar to the risk-based level established in the ROD (5.2 µg/L), the risk-based level is still considered protective. At this time, there is no reason to change the ROD to adopt the State MCL.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 7-5.

Table 7-5. Response to Recommendations from 2001 Five-Year Review for OU4 Landfill

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Change IC boundary to cover area where groundwater plume from landfill leachate affects downgradient aquifers	ICs for Fort Wainwright were revised in 2002; the newly established IC boundary for this site is shown in Plate 1-I	U.S. Army	2002	No

7.3 OU4 – Coal Storage Yard

7.3.1 Overview

The CSY is located south of the Fort Wainwright power plant and east of the power plant cooling pond (Figure 7-2). The area of concern was located within an area approximately 800-ft by 300-ft between the cooling pond and an embankment. Historically, coal was stored directly on the ground without a liner, and waste petroleum products and chlorinated solvents were sprayed over the coal pile to increase the energy output of the plant, a practice which has been discontinued. Two 10,000-gallon USTs were installed in the 1980s to contain waste oil for the practice of spraying to increase thermal output. Before these tanks were installed, waste oil was placed in drums adjacent to the coal pile. The two 10,000-gallon USTs were removed in July of 1995.

The chosen alternative in the ROD, signed September 1996, was *in-situ* treatment of soils and groundwater by enhanced soil vapor extraction/air sparging. The treatment system was installed and began operation during the summer of 1997. It was operated on a seasonal basis (May to October) until October 2000 when it was shut down to evaluate rebound.

Soil sampling was conducted at the site between 1999 and 2002, and groundwater sampling was conducted semi-annually (in the spring and fall) until 2003 when it was determined the ROAs had been achieved. The treatment system was decommissioned in 2004. The Army has recommended the site for No Further Action.

Periods of use and dates related to the history of the OU4 CSY source area contamination and remediation are summarized in Table 7-6.

Table 7-6. History of Regulatory Events at the OU4 CSY[a]

Event	Date
Active coal pile sprayed with waste petroleum fuel products and solvents	1950s to 1993
Soil borings and installation of 9 monitoring wells	1986
Fort Wainwright NPL listed	August 1990
Re-sampling of monitoring wells. Soil sampling conducted at the active coal pile and along road adjacent to cooling pond.	1991
FFA signed	1992
2-PTY signed	1992
Release investigation conducted at location of UST 295 (formerly located with the fenced area) and groundwater survey conducted beneath the active coal pile.	1993
OU4 RI conducted	1993
Two USTs removed from fenced storage area adjacent to CSY	1995
ROD signed	August 1996
AS/SVE treatment system and nested groundwater monitoring wells installed	Summer 1997
RAR finalized	April 1999
OM&M available to public	January 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002
CLOSES Evaluation for OU4 CSY	2003
AS/SVE treatment system decommissioned	2004

[a] Information compiled from the OU4 ROD; Final 1999 CSY System Monitoring Report; OU4 CSY OM&M; and the Five-Year Review Report Document Log.

7.3.2 Background

Physical Characteristics

The areas north and east of the CSY are industrial areas, while the areas to the south and west have mixed hardwood forests. A man-made unlined cooling pond is located immediately to the west and is used solely for industrial purposes to cool circulated water from the power plant. The source area is in a 500-year floodplain. No endangered or threatened species reside in the area.

Land and Resource Use

The CSY is used to stockpile supplies of coal prior to burning at Fort Wainwright's coal-fired cogeneration power plant. This power plant is the sole source of heat and electricity for Fort Wainwright. The coal is transported to the CSY vial rail and off-loaded through hopper and along a conveyor which deposits the coal on the south side of the power plant. Coal is stored in the yard directly on the ground without the use of a liner.

Water supply wells for Fort Wainwright are located downgradient of the CSY source area and are approximately 900 feet northwest of the active coal pile. Flow velocities based on measured gradients were estimated to range widely from 243 ft/year to 2,917 ft/year. The cooling pond is hydrologically connected to the groundwater aquifer and may affect groundwater flow locally. Groundwater flows generally north to northwest and varies due to water supply well pumping patterns.

Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

History of Contamination

Activities at the CSY began in the 1950s with the industrial operation of the Post power plant. Based on historical documents, the CSY's active coal pile was sprayed with waste petroleum fuel products to increase the heat content of the coal. This practice was discontinued in 1993. As the active coal pile was consumed, the active pile area was graded to include the top layer of soil and intermixed coal, and then burned in the power plant. New coal supplies were then added to the storage yard.

A fenced area existed within the CSY and contained a staging or storage area for drums. Surface spills of materials were common and associated leakage or spillage of material from the drums may have been another source of contamination.

Pre-ROD Response

Application of POLs and solvents to the coal pile was discontinued in 1993.

7.3.3 Remedy Selection

Nature of Contamination

Original contaminant sources at the CSY included diesel, fuel oil, chlorinated solvents, and lubricants sprayed on the active coal pile; and waste oil spills and leaks from tanks and drums. VOCs and petroleum contaminated subsurface soils were identified during RI activities in 1994. Soils contaminated with these chemicals were considered sources of groundwater contamination at the CSY. Contaminants have been transported by overland flow of surface water (i.e., rain or snowmelt), vertical migration through soils to the groundwater aquifer, and volatilization. VOC contamination at the groundwater interface and at depth was found to be limited laterally to the area under the active coal pile and fenced storage yard.

Chemicals of concern identified in the ROD for the CSY source area include benzene, bis(2-ethylhexyl)phthalate, toluene, and TCE in the groundwater.

Remedial Action Objectives

Groundwater

- Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater from the source areas
- Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)
- Use natural attenuation to attain AWQS (18 AAC 70)

Soil

- Prevent migration of soil contaminants to groundwater that could result in groundwater contamination and exceedances of federal MCLs and AWQS (18 AAC 70)

ARARs

The OU4 ROD cited the most significant ARARs for remedy selection at both the Landfill and the CSY to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for the CSY as discussed below. Cleanup goals for COCs at the OU4 CSY are shown in Table 7-7.

Table 7-7. Cleanup Levels for Chemicals of Concern at the OU4 CSY

Media	Chemical of Concern	ROD Cleanup Level	Basis	Current Cleanup Levels
Groundwater	Benzene	5 μg/L	MCL	5 μg/L[a]
	Bis(2-ethylhexyl)phthalate	6 μg/L	MCL	6 μg/L[a]
	Toluene	1,000 μg/L	MCL	1,000 μg/L[a]
	TCE	5 μg/L	MCL	5 μg/L[a]
Surface & Subsurface Soils	Benzene	0.5 mg/kg	ADEC[b]	0.02 mg/kg[c]
	BTEX	15 mg/kg	ADEC[b]	NA
	DRO	200 mg/kg	ADEC[b]	200 mg/kg[b]
	GRO	100 mg/kg	ADEC[b]	100 mg/kg[b]

[a] MCLs from NPDWR and 18 AAC 75 Table C
[b] Cleanup Levels from Method One petroleum cleanup levels in 18 AAC 75 Table A1 Part B, based on a matrix score of 39 (as calculated in the ROD)
[c] Cleanup Level from migration-to-groundwater in the under 40-inch zone from 18 AAC 75 Table B1, as amended October 16, 2005.
Note: NA = not applicable; the ADEC soil cleanup level for BTEX was changed to the cleanup level for benzene, toluene, ethylbenzene, and xylene specified in 18 AAC 75 Table B1.

Groundwater

Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, bis(2-ethylhexyl)phthalate, toluene, and TCE at the CSY. There were no risk-based cleanup levels established for groundwater at the CSY.

Soil

Soil cleanup goals in the ROD for petroleum hydrocarbons at the CSY were developed using ADEC Method One based on a matrix score of 39 for the site. At the time of the ROD, these goals set concentration limits for benzene, total BTEX, DRO, and GRO. There were no risk-based cleanup levels established for soil at the CSY. Since the time of the ROD, the cleanup level for total BTEX has been changed to the cleanup level for each constituent, as specified in 18 AAC 75 Table B1.

Selected Remedy

AS/SVE

To achieve the RAOs for the CSY, *in-situ* treatment of groundwater by air sparging was selected to remove VOCs and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. Air sparging wells were placed in areas of highest contamination. *In-situ* treatment of soils by soil vapor extraction was also recommended, with extraction wells placed in areas of highest contamination and operated until groundwater MCLs were achieved. The treatment system was to be evaluated and modified as necessary to optimize effectiveness in achieving RAOs. Nine years of operation of the AS/SVE system was estimated to achieve soil and groundwater RAOs and remediate groundwater to federal MCLs and soil to ADEC goals for petroleum contamination.

Natural Attenuation with Groundwater Monitoring

After active treatment had achieved soil cleanup levels, natural attenuation would be relied on to achieve federal and state groundwater MCLs. Monitoring of the nested downgradient wells was also recommended to ensure protection of Post drinking water supply wells during remedial action. ICs, including restricted access and well development restrictions, were to be adopted as long as hazardous substances remained on site at levels that precluded unrestricted use. Restrictions on groundwater use were also implemented until contaminant levels fell below federal MCLs and AWQS.

7.3.4 Status of Remediation

AS/SVE Treatment System

In the summer of 1997, an AS/SVE treatment system was installed. The system consisted of 27 air sparge points and 14 SVE wells. Due to steam plant operational considerations, the system did not cover the entire area suspected to be contributing to groundwater contamination above remedial action objectives. The treatment system was designed to operate only during summer months (May through October). The system was shut down in October 2000 to conduct a rebound study. Soil sampling conducted in 2002 indicated no residual contamination in the area of concern, and groundwater levels (as discussed below) did not show any signs of rebound. The treatment system was decommissioned in 2004.

Groundwater Monitoring

Groundwater monitoring was performed at the CSY semi-annually until 2003 when the decision was made by the RPMs that the RAOs had been met and monitoring could be discontinued.

No COCs have been detected at levels exceeding MCLs in any wells at this site since 2001. Only two of the COCs, bis(2-ethylhexyl)phthalate and TCE, had ever been detected in the groundwater at concentrations exceeding MCLs. Plate 7-I presents groundwater concentrations over time since the ROD.

Prior to 2002, bis(2-ethylhexyl)phthalate was detected in several wells at the site, but concentrations were highly variable, fluctuating from above the MCLs to non-detect in consecutive sampling efforts. Because bis(2-ethylhexyl)phthalate is a commonly known laboratory contaminant, and historic results were highly variable, the data was not considered representative of true site conditions. In addition, the normal methods used to identify this contaminant had a practical quantitation limit (PQL) that was three times higher than the cleanup level set in the ROD. In order to address these issues, during the 2002 sampling effort a modified SW8270SIM method was performed on all CSY groundwater sampled to specifically identify bis(2-ethylhexyl)phthalate at a PQL below the ROD cleanup level. The results of this study found that bis(2-ethylhexyl)phthalate was non-detect in all but four wells, and in those four wells the concentrations were below the MCL.

TCE was detected at levels exceeding its MCL in one well, AP-6407. However, concentrations of TCE declined after initiation of the treatment system, and dropped to below the MCL in 2000. TCE did not exceed the MCL in this or any other well since the May 2000 sampling effort.

Institutional Controls

Although the site has been recommended for NFA, ICs are still in effect at the CSY. Plat1 1-I depicts the areas where the ICs apply.[5]

Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites. This policy ensures that:

- No unauthorized intrusive actions take place at the source area,
- No potable water wells are installed on the source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

[5] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

Site Inspection

Because there are no remedial actions or monitoring taking place there, and the site has been recommended for NFA, the CSY was not visited during the June 6, 2006 site inspection.

7.3.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

The AS/SVE system was operational between 1997 and 2000. It functioned as intended and contaminant concentrations in the soil and groundwater decreased to below cleanup levels. The system was decommissioned in 2004 and groundwater monitoring at the site was terminated following the 2003 sampling effort. RAOs have been met at this site.

ICs for the CSY are in place. Excavation on this site is restricted and may only be authorized by DPW Environmental. Groundwater intrusion is also restricted and may only be authorized by DPW Environmental.

Table 7-8 summarizes performance to date related to the RAOs for the OU4 CSY.

Table 7-8. Performance to Date of Remedial Action Objectives at OU4 CSY

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	Contaminant concentrations of all COCs below MCLs
Reduce further migration of contaminated groundwater from the source areas	Contaminant concentrations of all COCs below MCLs
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS	Contaminant concentrations of all COCs below MCLs; ICs in effect
Use natural attenuation to attain AWQS (18 AAC 70)	Contaminant concentrations of all COCs below MCLs
Prevent migration of soil contamination to groundwater that could result in groundwater contamination exceedances of federal MCLs and AWQS (18 AAC 70)	Soil contaminant concentrations reduced to below cleanup levels

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- The MCLs used to establish groundwater cleanup goals for the CSY have not changed since the ROD.
- The 18 AAC 75 cleanup level for benzene in soil is now 0.02 mg/kg, compared to 0.1 mg/kg at the time of the ROD.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances

There are no known variances from the ROD.

Recommendations and Follow-up Actions

The groundwater and soils at the CSY have achieved RAOs and therefore the site has been recommended for NFA; no additional recommendations or follow-up actions are necessary.

The Post groundwater supply wells are located downgradient of this site (see Figure 3-1). A number of wells that are are being maintained and monitored annually for the Building 3564 2-PTY site are located upgadient of the supply wells. These wells will monitor potential migration from the upgradient 2-PTY petroleum site, as well as any newly discovered source (such as the Communications Site discussed in Section 8-7) so that the Base supply wells would have advanced warning of potential contamination.

ICs are also still in place for the area around the CSY. These precautions will ensure the protectiveness of the site.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review are shown in Table 7-9.

Table 7-9. Response to Recommendations from 2001 Five-Year Review

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Evaluate need for treatment system extension to under coal pile	Soil sampling beneath the coal pile was completed in 2002; no contamination was found to indicate expansion of the system was necessary	U. S. Army	2002	No
Relocate ICs to cover area where groundwater plume from CSY affects downgradient aquifer.	ICs still in place at the site; Downgradient wells being monitored annually	U. S. Army	2003	No

8 OPERABLE UNIT 5

8.1 OU5 Background

Operable Unit 5 (OU5) is identified as the final operable unit in the FFA and includes three source areas moved from previously investigated operable units as well as three source areas identified for inclusion in OU5 (Figure 8-1). Four source areas were identified for action in the ROD:

- Four sub-areas of the West Quartermaster's Fueling System (WQFS)
- East Quartermaster's Fueling System (EQFS)
- Remedial Area 1a, also called the Birch Hill Above-ground Storage Tanks
- Open Burning/Open Detonation (OB/OD) area

Two source areas were recommended for no further action under the CERCLA:

- Former EOD Range
- Motor Pool Buildings

In addition, several petroleum-contaminated sites, including one WQFS subarea, have been and are being addressed in accordance with the 2-PTY. The list of OU5 source areas and their status is shown in Appendix F.

The OB/OD area and former EOD range were determined to require no further action under CERCLA. The ROD addresses remediation of WQFS subareas 1 through 4, the EQFS, and Remedial Area 1a (Figures 6-1 and 8-2). In addition, the OU5 ROD describes the Army's commitments to the Chena River Aquatic Assessment Program (CRAAP) and to ICs at all five OUs and commits to an IC program that includes a Standard Operating Procedure (SOP) for ensuring compliance with the ICs. The OU5 Five-Year Review is thus organized into the following sections: WQFS, EQFS, Remedial Area 1a, Chena River, and ICs.

8.2 WQFS

8.2.1 Overview

The WQFS area covers approximately 50 acres. The WQFS was divided into four subareas: WQFS1, WQFS2, WQFS3, and WQFS4 (Figure 8-2). Soils within WQFS4 are being addressed under the 2-PTY so were not included in remedial actions under OU5; however the groundwater beneath WQFS4 is being addressed in OU5.

The WQFS is located between Front Street and Gaffney Road. The area includes from the southeast boundary of the taxiway to the Chena River on the northern boundary. Groundwater sampling results prior to the RI in 1995 indicate DRO, GRO, chlorinated solvents, and benzene contamination. Soil investigations in 1994 identified contamination by fuels and chlorinated solvents related to past activities at the site. Sources of contamination included ASTs, USTs, and fuel pipelines. Most of the fuel tanks were removed in the 1980s and an 8-inch diameter pipeline was abandoned in place. Abandoned pipelines were cleaned and purged in 2000.

A fuel leak into the Chena River occurred near WQFS in 1980. The source was unknown, but the 8-inch pipeline along the north side of Gaffney Road was suspected. The Army dug a trench between Apple Road and the river to capture the spill, and installed sheet-metal retaining structure to prevent fuel migration to the river. However, sheens had been observed in the river below the retaining structure. In April 1998, about 700 cy of contaminated soil and the retaining structure were removed. The removal resulted in source reduction (soil and sediment) of free-product release to the Chena River.

A RI was completed at the WQFS in 1995. A treatability study was conducted from 1996 to 1998, which attempted to use ORC to enhance the rate of reduction of VOCs, but had limited success. An additional treatability study, using radio frequency and six-phase heating to heat soil and enhance biodegradation and volatilization was completed in 1999 with mixed success. Bench-scale tracer and biodegradation studies were also conducted to better understand the persistence of the contamination.

The WQFS contains three remediation systems. The systems include: the Sparge Curtain (SC), Source Area (SA), and the Horizontal Well (HWL). All three systems consisted of AS/SVE with catalytic oxidation. Over the last five years, some of the systems have been expanded and the sparge points redeveloped to enhance the performance of these remediation systems. A brief operational history of these three systems is presented herein to document the work performed at the WQFS.

The SC remediation system is an AS/SVE curtain designed to protect the Chena River. Prior to the installation of the SC in June 1998, the retaining structure in WQFS2 was removed. The SC consisted of four treatment zones (Figure 8-3). In 2000 the system was expanded to include hotspot remediation of the WQFS3 hot spot. In 2001 the system was further expanded at WQFS2. During the same time, subsurface soil samples were collected. In August 2003 the AS/SVE for WQFS3 was permanently shut off. In October 2002 the SC along the Chena River was redeveloped to increase sparging efficiency. In January 2004 due to diminishing contaminant recoveries the SVE and catalytic oxidizer were taken off line. Since that time, the only system running at the WQFS has been the AS associated with the SC along the river. Groundwater modeling has been completed to determine groundwater movement and contaminant transport and remedial action effects on the Chena River. The modeling showed that the on-going remedial actions are protective.

The SA remediation system was installed in October 1998 (Figure 8-3). Initially, this was a field-scale system of nine SVE well, four AS wells, and four passive vent wells. In 1999 soil heating to enhance AS/SVE was evaluated and found not to be cost-effective for relatively volatile contaminants such as those subject to OU5 cleanup goals. In 2001 the system was expanded to 123 AS wells and 21 SVE wells in three zones with a catalytic oxidizer. As part of the system expansion, eight soil borings were completed and two soil samples were collected from each boring. In 2003 the AS wells were redeveloped to increase sparging efficiency. In November 2005 the SA AS/SVE system was shut down due to diminishing contaminant recovery.

The third system is the HWL, which was installed in the spring of 1997 (Figure 8-3). Originally the system was comprised of two horizontal drilled wells; one below the water table that was used for air sparging, the second above the water table that was used for vapor extraction. The treatment system utilized a catalytic/thermal oxidizer to minimize air emissions. In 1998 the system was augmented by installing 123 AS wells and 40 SVE wells. A second expansion occurred in 2001 bringing the system total to 170 AS wells and 47 SVE wells in four active treatment zones. In 2003 the AS system probes were redeveloped to increase sparging efficiency across the site. The system was shut down in November 2005 due to diminishing contaminant recovery.

The OU5 ROD, signed in April 1999, identified the remedial actions for the WQFS as AS/SVE, potential *in-situ* soil heating in hot spots, potential operation of a downgradient air sparging curtain, groundwater monitoring, monitored natural attenuation (MNA), and LTM.

ICs are in place in the entire WQFS; an informational sign has been installed to inform the public of activities in this area. Operation, Maintenance and Monitoring reports have been completed related to the operations of the AS/SVE systems. The LTM plan and exit strategy, as well as the interim Remedial Action Report have been completed.

Biannual groundwater sampling has been performed at the WQFS since 1999 to monitor impacts to groundwater. Data from these groundwater sampling events are summarized Plate 8-I. In 2001 - 2002 sampling was completed from a groundwater network of 22 monitoring wells. In 2002 the number of wells sampled was increased to 43 wells. In 2003 and 2004, 27 monitoring wells were sampled as part of the groundwater monitoring program. A CLOSES evaluation was performed in May 2003 that recommended continued sampling of 23 wells. ICs are in place and an informational sign was installed to inform the public of restricted activities at the site. EPA determined this remedy to be operational and functional as of 2002. The Operations and Maintenance Manuals were submitted in 2002, and the Interim Remedial Action Report was submitted in 2002 by CH2M Hill.

Subsurface soil samples were collected from the WQFS over the period of 1997 to 2002. The intent of these soil samples was document the extent of the contaminants within the vadose zone of OU5 as part of earlier site studies. More recently, subsurface soil samples had been collected to document the efficacy of the three remediation systems installed at these sites. The soil samples were collected from the SC, SA, and HWL from 1997 to 2002.

Influences from the WQFS to the Chena River were studied under the CRAAP, which is further discussed in Section 8.5.2.

8.2.2 Background

Periods of use and dates related to the history of WQFS contamination and remediation activities are include in Table 8-1.

Physical Characteristics

The WQFS is bordered to the north by a south trending meander of the Chena River, to the west by the ROLF, to the south by Taxiway 18, and to the east by the EQFS. The terrain is open tussock flats as the buildings have all been removed from the site. The WQFS is located within the 500-year floodplain of the Chena River. No endangered or threatened species reside in the area.

History of Contamination

Activities within the WQFS included vehicle and aircraft maintenance operations and the associated use and disposal of solvents and other cleaning and maintenance compounds. The WQFS also included USTs and ASTs, a pump house and fueling islands. Drains within the WQFS were connected to a wooden pipe that drained to the river. The underground fuel pipelines and a network of aboveground and buried fuel piping were abandoned in place. The primary sources of contaminants in groundwater at WQFS were from surface disposal of solvents, petroleum spills and leaks, and other past disposal practices.

Table 8-1. History of Regulatory Events at OU5 WQFS[a]

Event	Date
Industrial use including maintenance activities involving the use of solvents, POLs, pesticides, and other hazardous materials	1930s to 1960s
A leak of approximately 30,000 gallons of diesel fuel	1971
16,000 gallons of gasoline spilled	1971
Fuel leak of unknown origin into the Chena River	1980
Fort Wainwright NPL listed	August 1990
FFA signed	1992
2-PTY signed	1992
North Airfield groundwater investigation	1994
RI completed	1996
Initiation of WQFS1 Horizontal Well AS/SVE with Treatability Study	Spring 1997
Initial CRAAP investigations conducted	1997 / 1998
FS completed	1998
Proposed Plan for Remedial Action at OU5 finalized	June 1998
OU5 bench-scale column study initiated	January 1998
Initiation of soil heating AS/SVE Treatability Study at WQFS1	Spring 1998
Initiation of WQFS1 source area AS/SVE Treatability Study	Aug and Sept 1998
WQFS2 AS curtain Treatability Study initiated	August 1998
OU5 ROD finalized	May 1999
WQFS3 AS/SVE Treatability Study initiated	August 2000
Draft 2000 Preliminary Draft Remedial Action Report (PDRAR) finalized	April 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Additional CRAAP investigation conducted	2002
Fort Wainwright Construction Complete Received from the EPA	2002
WQFS2 SVE and catalytic oxidizer shut down	January 2004
WQFS1, 3, and 4 AS/SVE systems shut down	November 2005
Rebound Study Performed on WQFS presently on-going	On-going

[a] Information compiled from the OU5 ROD; Draft OU5 PDRAR; and the Five-Year Review Report Document Log.

Land and Resource Use

Current land use for the WQFS is light industrial; current and future groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater. The closest residences to WQFS are about one mile west. The residential area includes a school. Currently access to WQFS is unrestricted, and the area is used for recreational purposes and includes a bicycle trail. Access to the Chena River is unrestricted.

Pre-ROD Response

Removal or treatability studies completed prior to the ROD include the following:

- In WQFS3 several leaking drums of tarry substance exposed along the Chena River were removed in 1995; nine nearby buried drums and approximately 3 cy of contaminated soil were excavated in 1996
- In 1998 approximately 700 cy of contaminated soil and a sheet metal retaining structure was removed from WQFS2; an air sparging curtain was installed in this area to minimize contaminant movement into the Chena River
- Several treatability studies were initiated in the WQFS prior to the signing of the ROD for OU5, with the intent that effective technologies would be considered for incorporation into WQFS and EQFS remediation plan
- AS/SVE with Horizontal Wells - WQFS1
- Source Area AS/SVE - WQFS1
- *In-Situ* Soil Heating - WQFS1
- *In-Situ* ORC - WQFS2
- Bench-scale Column Study of Factors Limiting Bioremediation Rate

8.2.3 Remedy Selection

Nature of Contamination

Groundwater

Prior to the installation of the remediation system at the WQFS, groundwater contamination extended approximately 70 ft-bgs or 60 feet below the water table and the approximate extent of groundwater contamination is 43 acres. Initial investigations conducted at the WQFS revealed four groundwater plumes. Two free-product plumes (mostly jet fuel and diesel fuel) existed within the source area. The larger plume was about 4-1/2 acres and encompasses the area where the majority of fuel pumps, dispenser islands, and storage tanks were located. The smaller free-product plume extended about 600 feet southwest of Building 1599 and coincided with a bermed area around a possible fuel containment structure. A benzene plume covered about 25 acres. A plume of 1,2-DCA extended from the north of Front Street to the Chena River, overlapping the free-product and benzene plumes and extended to a depth of approximately 20 ft-bgs. DRO and GRO were also detected but their extent was not defined.

Prior to the remediation systems being installed, light non-aqueous phase liquids (LNAPL) existed on the water table in the area influenced by releases from the WQFS. Contaminants reported in the groundwater at the WQFS included benzene, 1,2-DCA, toluene, and TCE in concentrations exceeding MCLs, and TAH) and TAqH in concentrations exceeding the AWQS.

EDB had been detected in concentrations exceeding MCLs in groundwater samples from two locations in WQFS1. EDB had not been reported in the WQFS at the time of the ROD. EDB was subsequently included as a groundwater contaminant of concern.

Soil

Contaminants of concern at WQFS affected approximately 150,600 cy of soil. Soil contamination in WQFS subareas is thought to be due to the following historical practices: in WQFS1 vehicle maintenance at former Building 1599 and leaks from former fuel storage and handling; in WQFS2 former ASTs and an eight-inch fuel pipeline that parallels Gaffney Road; and in WQFS3 a 6-inch wood-stave pipe through which diesel and gasoline were channeled during fuel releases in 1971 as well as possible drum storage or road-maintenance activities.

Soils in the WQFS contained BTEX, semi-volatile compounds (SVOCs), and petroleum hydrocarbons in concentrations greater than State and Federal cleanup guidelines.

Remedial Action Objectives

The ROD identified the following objectives for remediation of OU5:

Groundwater

- Restore groundwater to its beneficial uses within a reasonable time frame. Reduce or prevent further migration of contaminated groundwater from the source areas to the downgradient aquifer or surface water bodies that are closely hydrologically connected by achieving MCLs (where there are no nonzero maximum contaminant level goals [MCLGs]) and AWQS. For groundwater that is hydrologically connected to surface water, Alaska Water Quality Standards will apply for the following Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.
- Ensure there is no risk to aquatic receptors through control of contaminant movement through the groundwater into the Chena River.
- Remove LNAPL to the extent practicable to eliminate film or sheen from groundwater.
- Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act MCLs, non-zero MCLGs, or the following AWQS for Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.

Soil

- Prevent the migration to groundwater of soil contaminants that could result in groundwater contamination and exceedances of federal MCLs and nonzero maximum contaminant level goals (MCLGs) and to groundwater that is closely hydrogeologically connected to surface water (such as the Chena River) that could result in exceedances of AWQS in surface water.

Chena River Sediments

- Reduce sources of contaminant releases to the Chena River

Chena River Surface Water

- Meet Alaska Water Quality Standards for the following Fresh Water Uses: (1)(A) Water "J Supply; (1)(B) Water Recreation; and (1)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife
- Continue aquatic assessment

ARARs

The OU5 ROD cited the most significant ARARs for remedy selection at this site to be:

- Federal and state MCLs are relevant and appropriate for groundwater that is a potential drinking water source (40 CFR 141 and 18 AAC 80). These ARARs set the active remediation goals for groundwater; Alaska Water Quality Standards (18 AAC 70) are also applicable to surface water, sediment, and groundwater that is closely hydrologically connected to surface water
- Alaska oil pollution regulations (18 AAC 75) are applicable and require the cleanup of oil or hazardous material releases

Cleanup Goals

Based on the baseline risk assessment for projected land and resource use at the WQFS, the ROD adopted the following cleanup goals:

Groundwater

- Federal and state MCLs for 1,2-DCA, benzene, and toluene, and State of Alaska (18 AAC 75) cleanup levels for GRO, DRO, and residual range organics (RRO) were adopted as numeric cleanup goals for the WQFS. In addition, the ROD identified elimination of any sheen caused by floating petroleum product as a cleanup goal.

Soil

- The cleanup goal for soil in the WQFS is active remediation of soils until contaminant levels in groundwater are consistently below state and federal cleanup levels.

Chena River Sediments

- No concentrations of toxic substances or petroleum hydrocarbons and other contaminants in bottom sediments that cause deleterious effects to aquatic life, to be determined by benthic macroinvertebrate assessment
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity through time

Chena River Surface Water

- 10 µg/L TAH
- 15 µg/L TAqH
- Eliminate petroleum hydrocarbon sheen
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity over time
- Groundwater monitoring to assess reduction of contaminant releases to the Chena River

Numeric values for the cleanup goals established in the RODs are summarized in Appendix B.

Selected Remedy

The ROD identified different remedial actions for the different subareas of the WQFS as described below.

WQFS1

- Operating an AS/SVE system to address solvent and petroleum contamination in the source-area soil and groundwater and the floating-product contamination. The source area AS/SVE system had been used to strip VOCs from groundwater and soil and to enhance biological degradation of contaminants in saturated- and vadose-zone soils. The SVE system included a catalytic oxidizer for off-gas treatment.
- Potential *in-situ* heating at hot spots was proposed as a method to increase the rate of remediation in comparison to source-area treatment without heating. In the event that AS was ineffective in achieving progressive reduction of the VOC and petroleum hydrocarbon concentrations in soils, *in-situ* soil heating had been proposed as a means to increase the movement of VOCs and make them easier to extract. Treatability studies involving radio-frequency soil heating and six-phase soil heating were initiated in WQFS1 to evaluate the potential to enhance performance of AS and SVE. The studies found that soil heating was not cost-effective for relatively volatile contaminants such as those present at OU5.
- Establishing and maintaining ICs to ensure that until federal and state MCLs are attained, the groundwater will not be used as a potable water source. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Groundwater and land-use restrictions have been incorporated into the Fort Wainwright Master Plan.
- Monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased will also be monitored.

- Monitoring the performance of remedial treatment systems, as described above, to optimize treatment system effectiveness and efficiency through system modifications and/or enhancements as appropriate.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs.
- Monitored natural attenuation for deep groundwater and areas not being actively treated within WQFS1.

WQFS2

- Installing an AS/SVE system to address solvent- and petroleum-contaminated hot spots in the soil and groundwater and floating-product contamination. The hot-spot AS/SVE system has been used to strip VOCs from groundwater and soil and to enhance biological degradation of contaminants in saturated- and vadose-zone soils. The SVE system included the use of a catalytic oxidizer for off-gas treatment.
- Continuing to operate a downgradient AS curtain to intercept and remove dissolved-phase contaminants from the groundwater, thus minimizing potential impacts to the Chena River.
- Conducting groundwater monitoring to determine whether cleanup levels are achieved and maintained downgradient of the AS curtain.
- Establishing and maintaining ICs to ensure that until federal and state MCLs are attained, the groundwater will not be used, except for activities undertaken to initiate the selected remedies detailed in this ROD. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Groundwater- and land-use restrictions will be incorporated into the Fort Wainwright Master Plan.
- Monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased will also be monitored.
- Monitoring performance and optimized remedial treatment system effectiveness and efficiency through modifications and/or enhancements as appropriate.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs.
- Monitoring natural attenuation for deep groundwater and areas not being actively treated within WQFS2.
- Installing a harbor boom downgradient of the AS curtain to control contaminant releases into the Chena River.
- Conducting a pilot-scale ORC system.

WQFS3

- Installed AS/SVE wells to address solvent- and petroleum-contaminated hot spots in the soil and groundwater and floating-product contamination. The hot-spot AS/SVE system has been used to strip VOCs from groundwater and soil and to enhance biological degradation of contaminants in saturated- and vadose-zone soils. The SVE system included a catalytic oxidizer for off-gas treatment. AS and SVE wells were located in the contaminant hot spot.
- Establishing and maintaining ICs to ensure that until federal and state MCLs are attained, the groundwater will not be used, except for activities undertaken to initiate the selected remedies detailed in this ROD. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Groundwater- and land-use restrictions will be incorporated into the Fort Wainwright Master Plan.
- Monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased will also be monitored.
- Monitoring the performance of remedial treatment systems as described above, to optimize treatment system effectiveness and efficiency through system modifications and/or enhancements as appropriate.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs.
- Monitored natural attenuation for deep groundwater and areas not being actively treated within WQFS3.

8.2.4 Status of Remediation

The following description of the status of the WQFS remediation systems is based on the OU5 Annual Reports and Federal Facility Agreement Meeting minutes, which details the status of remediation systems at the WQFS.

All WQFS Sub-Areas

These remedial activities are applicable to all WQFS sub-areas:

Purge Abandoned Fuel Lines

Abandoned buried fuel lines in the WQFS were pigged and capped in 2000.

Natural Attenuation and Groundwater Monitoring

As part of the natural attenuation and groundwater monitoring program, groundwater modeling was performed to compare the effects of treatment to what would be projected from natural attenuation and to estimate contaminant loading to the Chena River. This modeling assisted in development of a Time to Cleanup Estimate[1] and in placement and sizing of "hot spot" treatment systems.

Institutional Controls

Land and water use restrictions are in place for the WQFS. Plate 1-I depicts the OU5 IC boundary, as it exists in the Fort Wainwright GIS. This boundary appears to adequately encompass the areas of soil and groundwater contamination that could pose risk of exposure to personnel during intrusive operations in WQFS subareas.

Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites.[2] This policy was last updated in 2002, but is currently under review and a new update is expected in 2006. There have been no violations of the IC policy to date. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Probe Rehabilitation

In September 2003, approximately 300 air sparge and soil vapor extraction probes in the Horizontal Well, Source Area, and Sparge Curtain systems were rehabilitated using the "hydro-shock" method.[3] The rejuvenation of the probes significantly improved the efficiency of these systems.

---

[1]The Time to Cleanup Estimate is a tool that uses a group of spreadsheets that predicts the effect of of treatment and estimates the time required for the remediation of selected petroleum hydrocarbon factions (CH2M Hill 2000).

[2] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

[3] Over time, air sparge probes often become blocked by iron precipitation and/or silt encrustation of the probe screen. This limits the amount of air-flow moving through the probe, which in turn decreases the effectiveness of the AS/SVE system. "Hydro-shocking" is a method that was developed for rehabilitation of air sparge wells. This technique uses a tool that discharges a powder charge cartridge below the water table inside the probe. This creates a shock wave that breaks up the encrustation, ultimately clearing the probe screen.

WQFS1

Horizontal Well AS/SVE System - The HWL AS/SVE system was selected as the remedial action for this site. The AS/SVE including a thermal/catalytic heater for off-gas treatment was installed in the spring of 1997 as a treatability study and was expanded by installing vertical AS probes and SVE probes in the summer of 1998. In 2001 the system was again expanded to 170 AS wells and 47 SVE wells. From startup in October 2001 to July 2005, the HWL system has removed 42,007 pounds, or 21.0 tons, of petroleum hydrocarbons. Groundwater sampling indicates a decreasing trend in concentrations for COCs in the treatment zones. The latest sampling results from 2005 demonstrate that most COCs are below the MCLs. No samples collected during May 2005 contained GRO or benzene above the MCLs. DRO concentrations are highly variable. Most wells sampled during May 2005 contained DRO in excess of the MCLs within the HWL remediation area. A number of other wells within the HWL treatment area contained elevated concentrations of COCs in the early phases of monitoring; however, concentrations have dropped over time below MCLs. The HWL system was shut down in November 2005 due to diminishing contaminant removal. A contaminant rebound study is currently being conducted.

Source Area AS/SVE - In the SA AS/SVE was selected as a remedial action. The SA field-scale system was installed in October 1998. The system consisted of nine SVE well, four AS wells, and four passive vent wells. In 2001 the system was expanded to 123 AS wells and 21 SVE wells in three zones with a catalytic oxidizer. Since September 2001, the treatment system has removed 102,319 pounds of VOCs from September 2001 through July 2005. Groundwater contaminant concentrations in the treatment zone indicate a decreasing trend. Similar to HWL the SA has variable concentrations of DRO in groundwater. Concentrations of DRO are found in several wells above the MCLs. GRO and benzene were not detected above the MCLs for the SA. EDB concentrations exceeded MCLs in two wells during 2005. The SA system was shut down in November 2005 due to diminishing contaminant removal. A contaminant rebound study is currently being conducted.

WQFS2

The AS curtain system was installed in June 1998 and became operational that fall. The curtain intercepts and treats groundwater contaminants prior to migration into the Chena River. A harbor boom was installed in 1998 downgradient of the AS curtain to control contaminant releases into the Chena. This boom has been effective and is currently still in use on a seasonal basis. It was chosen as a component for this remedial action for this subarea. The AS curtain system has operated continuously since startup in 2000, with some minor down times for system maintenance. An ORC treatability study was evaluated in 1998 and determined not to be effective for this source area. The ORC wells were later decommissioned in 2001. The AS/SVE was augmented during the 2001 construction season to improve system performance and expand the area of treatment. In October 2002 the SC along the Chena River was redeveloped to increase sparging efficiency. In January 2004 due to diminishing contaminant recoveries the SVE and catalytic oxidizer were shut down. Since that time, the only system running at the WQFS has been the AS associated with the SC along the river.

WQFS3

An additional AS/SVE treatment zone was installed at WQFS3 in the latter half of 2000 and operation began in January 2001. The wells were connected to the WQFS2 blowers and off-gas treatment system, which was modified to operate in the catalytic mode prior to WQFS3 system start-up. The system was shut down in 2003 when benzene, the COC present was reduced to below MCLs.

8.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

- Based on the status of remedial actions at the WQFS as reported in the Interim Remedial Action Report, the treatment systems have been effectively removing VOCs from soil, hot spots, and contaminated groundwater at the WQFS.
- Plate 8-I summarize the results of groundwater monitoring associated with these sites.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- EDB was reported in groundwater in the EQFS but not in the WQFS at the time the ROD was signed in 1999. EDB was later detected in groundwater in the WQFS in concentrations exceeding MCLs. Since then the AS/SVE systems in OU5 have been very effective in reducing EDB concentrations to MCLs. During the September 2005 sampling event, EDB was found in only two wells at concentrations above the MCL.
- The MCLs used to establish groundwater cleanup goals for the WQFS have not changed since the ROD; the EDB MCL has also not changed.

Has Any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information calling the protectiveness of the remedy into question at this time.

Variances

No significant variances from the ROD have been noted to date.

Recommendations and Follow-Up Actions

Recommendations and follow-up actions for the OU5 WQFS are shown in Table 8-2.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review for the WQFS are shown in Table 8-3.

Table 8-2. Recommendations and Follow-Up Actions for OU5 WQFS

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Continue the operation of the sparge curtain and seasonal use of the boom along the Chena River.	U.S. Army	EPA, ADEC	NA	No
Continue sampling groundwater biannually. Wells within and downgradient of the HWL and SA treatment system will be sampled as part of a contaminant rebound / natural attenuation monitoring program.	U.S. Army	EPA, ADEC	NA	No

Table 8-3. Response to Recommendations from 2001 Five-Year Review for OU5 WQFS

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Incorporate appropriate sampling of area downgradient of AS Curtain along the Chena River (seep area) into the LTM Plan of OU5	Monitoring wells were installed between the AS curtain and the Chena River to monitor groundwater prior to entering the river.	U.S. Army	2002	No
Incorporate appropriate sampling for EDB in WQFS groundwater into the OU5 LTM plan.	EDB was added to the sampling parameters for the site.	U.S. Army	2002	No

8.3 EQFS

8.3.1 Overview

The EQFS is located between Front Street and Gaffney Road (Figure 8-2). A benzene plume covered approximately 40 acres and may have extended under the Chena River in the past. The fueling system was supplied by an 8-inch diameter pipeline that connected the Birch Hill Tank Farm and the ROLF and was a suspected source of contamination. POL source removal was performed in 2000 and the pipeline was capped. During an UST Release Investigation gasoline and diesel fuel groundwater contamination was encountered. Monitoring wells and microwells were installed surrounding this plume. In 1989 and 1992, an investigation showed both petroleum and solvent contamination in the soil and groundwater. In 1994, a comprehensive evaluation of the EQFS was conducted, which included installing groundwater probes, soil borings, and monitoring wells. The groundwater data identified several plumes (fuels and solvents), and the soil data identified solvent contamination, which was believed to have originated from surface disposal and undocumented spills. The RI/FS was conducted in 1995 and a report issued in 1996. Chosen alternatives for remedial action at the EQFS included operation of the AS/SVE, groundwater monitoring, and monitored natural attenuation.

As a result of the RI an AS/SVE system was installed and operated east of Building 1060 (1060E) as part of treatability study. This system was shut down when contaminant concentrations achieved cleanup goals. The system was refurbished and relocated to the west side of Building 1060 to reduce fuel contamination in that area. The system became operational at Building 1060 West (1060W) in late 2000. The AS/SVE system only operated for 72 hours before the granular activated carbon (GAC) used to treat the SVE off-gases became loaded with contaminants and the system was shut down. The SVE system was later equipped with an electric catalytic oxidizer to treat off-gases and operations resumed mid-October 2001 and continued until October 2005 when the system was shut down due to diminishing contaminant removal.

Natural attenuation and intrinsic remediation treatability studies are on-going at the EQFS. As stated for the WQFS, ICs are in place for all of OU5. Operation, Maintenance, and Monitoring reports, the LTM plan, the exit strategy, and the interim Remedial Action Report have been completed.

8.3.2 Background

Periods of use and dates related to the history of EQFS contamination and remediation are included in Table 8-4.

Table 8-4. History of Regulatory Events at OU5 EQFS[a]

Event	Date
Area used for vehicle storage and maintenance, dry cleaning, fuels testing, refueling, pesticide storage and mixing, and waste storage.	1970s
FFA signed	1992
2-PTY signed	1992
Building 1054 (one of Motor Pool buildings) transferred from OU1 to EQFS area of OU5	June 1994
Natural Attenuation Treatability Study initiated	September 1997
AS/SVE Treatability Study initiated at Building 1060 East	June 1994
OU5 ROD finalized	May 1999
AS/SVE Treatability Study at Building 1060 East completed	September 2000
AS/SVE system installed at Building 1060 West site	August to December 2000
Final Intrinsic Remediation Evaluation report submitted	November 2000
Draft 2000 PDRAR finalized	April 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002
Building 1060 West AS/SVE system shut down	October 2005
Contaminant Rebound Study	On-going

[a] Information compiled from the OU5 ROD; Draft OU5 PDRAR; and the Five-Year Review Report Document Log.

Physical Characteristics

The EQFS area covers approximately 40 acres between Taxiway 18 and the Chena River, and between Building 1579 to the southwest and Building 1054 to the northwest. The EQFS is located within the 500-year floodplain of the Chena River. No endangered or threatened species reside in the area.

History of Contamination

The EQFS has been used for vehicle storage and maintenance, dry cleaning, fuels testing, refueling, pesticide storage and mixing, and waste storage (for example, PCB containing transformers, chemicals, paints, oils, brake fluid, and solvents). The EQFS included USTs, ASTs, a pump house, fueling islands, and an eight-inch diameter fuel pipeline which was abandoned, but still in place. In addition, drains were connected to a wooden pipe that drained to the river. Solvents, pesticides, and petroleum contamination were found in groundwater beneath the EQFS. Suspected sources include spills and leaks from pipelines, fueling stations and undocumented spills.

Land and Resource Use

Current land use for EQFS is light industrial and the groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the EQFS. The closest residences to EQFS are approximately ¼-mile northeast. Each residential area includes a school. Currently access to EQFS is unrestricted, and the area is used for recreational purposes and includes a bicycle trail. Access to the Chena River is unrestricted.

Pre-ROD Response

Two treatability studies were initiated at the EQFS prior to the signing of the ROD for OU5, with the intent that effective technologies would be considered for incorporation into remedial actions:

- AS/SVE at Building 1060 East
- Natural Attenuation Study

8.3.3 Remedy Selection

Nature of Contamination

Groundwater

The remedial investigation identified two groundwater contaminant plumes, one upgradient and one downgradient of Building 1565 containing benzene, EDB, 1,1,1-TCA, and TCE in concentrations exceeding MCLs; TAH and TAqH in concentrations exceeding AWQS; and bis(2-chloroethyl)ether in concentrations exceeding the concentration limit corresponding to 10^{-6} risk for residential use.

Floating petroleum hydrocarbon product was been observed on the water table in the area influenced by releases from the EQFS.

Soil

Soil contamination in this area has extended to the groundwater table and GRO was found in a localized area of smear zone soil. Free product, likely to be weathered gasoline, was also found at the EQFS south of Building 1060.

Remedial investigations found DRO, GRO, and xylenes exceeding ADEC cleanup guidelines in soils at the EQFS.

Remedial Action Objectives

The ROD identified the following objectives for remediation of OU5:

Groundwater

- Restore groundwater to its beneficial uses within a reasonable time frame. Reduce or prevent further migration of contaminated groundwater from the source areas to the downgradient aquifer or surface water bodies that are closely hydrologically connected by achieving MCLs (where there are no nonzero MCLGs) and AWQS. For groundwater that is hydrologically connected to surface water, AWQS will apply for the following Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.
- Ensure there is no risk to aquatic receptors through control of contaminant movement through the groundwater into the Chena River.
- Remove free liquid product to the extent practicable to eliminate film or sheen from groundwater.
- Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act MCLs, nonzero MCLGs, or the following AWQS for Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.

Soil

- Prevent the migration to groundwater of soil contaminants that could result in groundwater contamination and exceedances of federal MCLs and nonzero MCLGs and to groundwater that is closely hydrogeologically connected to surface water (such as the Chena River) that could result in exceedances of AWQS in surface water (EQFS and WQFS).

Chena River Sediments

- Reduce sources of contaminant releases to the Chena River

Chena River Surface Water

- Meet AWQS for the following Fresh Water Uses: (1)(A) Water "J Supply; (1)(B) Water Recreation; and (1)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife
- Continue aquatic assessment

ARARs

The OU5 ROD cited the most significant ARARs for remedy selection at this site to be:

- Federal and state MCLs are relevant and appropriate for groundwater that is a potential drinking water source (40 CFR 141 and 18 AAC 80). These ARARs set the active remediation goals for groundwater. AWQS (18 AAC 70) are also applicable to surface water, sediment, and groundwater that is closely hydrologically connected to surface water.

- Alaska oil pollution regulations (18 AAC 75) are applicable and require the cleanup of oil or hazardous material releases.

Cleanup Goals

Groundwater

Federal and state MCLs for 1,2-DCA, toluene, TCE, EDB; the 10^{-6} residential risk value for bis(2-chloroethyl)ether; and State of Alaska (18 AAC 75) cleanup levels for DRO, GRO, RRO, and total xylenes were adopted as numeric cleanup goals for the EQFS. In addition, the ROD identified elimination of any sheen caused by floating petroleum product as a cleanup goal for EQFS groundwater.

Soil

The cleanup goal for soil in the EQFS is active remediation until contaminant levels in groundwater are consistently below state and federal MCLs.

Chena River Sediments

- No concentrations of toxic substances or petroleum hydrocarbons and other contaminants in bottom sediments that cause deleterious effects to aquatic life, to be determined by benthic macroinvertebrate assessment

- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity through time

Chena River Surface Water

- 10 µg/L TAH
- 15 µg/L TAqH
- Eliminate petroleum hydrocarbon sheen
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity over time
- Groundwater monitoring to assess reduction of contaminant releases to the Chena River

Numeric values for the cleanup goals established in the RODs are summarized in Appendix B.

Selected Remedy

- Continuing to operate the AS and SVE wells of the Building 1060 AS/SVE treatability study system to address solvent- and petroleum-contaminated hot spots in the soil and groundwater and floating-product contamination. The SVE system includes off-gas treatment.

- Long term monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased is being monitored.

- Establishing and maintaining ICs to ensure that, until federal and state MCLs are attained, the groundwater will not be used, except for activities undertaken to initiate the selected remedies detailed in this ROD. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Land-use restrictions include limiting future land use to operations currently being conducted at the source area. Groundwater and land-use restrictions will be incorporated into the Fort Wainwright Master Plan.

- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs

- Monitored natural attenuation for deep groundwater and areas were not actively treated within the EQFS.

8.3.4 Status of Remediation

A natural attenuation treatability study for remediation of hot spots was started in September 1997. Sampling results identified groundwater contaminant concentrations to be below MCLs at the Building 1565 fueling operations hot spot and the 1,1,1-TCA spill area west of Building 1565, and greater than MCLs at the Avgas Pipeline hot spot.

The scope of the natural attenuation study, which became the selected remedy once the ROD signature was achieved, was for the deep groundwater and areas not actively treated within the EQFS. This monitoring has decreased in scope to a few remaining flow paths. Monitoring is currently on a five-year cycle, to be completed the year before each five-year review.

An AS/SVE system operated on the east side of Building 1060 from 1994 to 2000, and groundwater MCLs have been achieved. This included a small TCE hot spot at the northeast corner of Building 1060 that was successfully treated by AS/SVE. AS/SVE was discontinued at the east side of Building 1060 in September 2000.

Groundwater contamination on the west side of Building 1060 was initially monitored for natural attenuation. An AS/SVE system with GAC off-gas treatment was installed to treat this source area and operation began in December 2000. The system operated for 72 hours before the GAC used to treat the SVE off-gases became loaded with contaminants. The system was shut down and equipped with an electric catalytic oxidizer. Operations resumed mid-October 2001 and ran until October 2005 when the system was shut down due to diminishing contaminant removal. Initially, contaminant concentrations exceeded MCLs for benzene, DRO, EDB, and GRO in groundwater at this source area. In 2005 benzene, GRO and EDB were all below the MCLs in the four wells sampled. DRO concentrations remain variable, exceeding MCLs in 2 of 4 wells monitored in 2005. As part of a LTM plan, the site is being sampled for geochemical parameters to document MNA.

Subsurface soil samples were collected from four soil borings at the site in September 2000 and September 2002. The purpose of these samples was to document the performance of the AS/SVE system in reducing contaminants in the vadose zone.

Plate 8-II depicts the results of groundwater monitoring associated with the EQFS source area.

Institutional Controls

The IC use restriction boundary appears to adequately encompass the areas of soil and groundwater contamination that could pose risk of exposure to personnel during intrusive operations in the EQFS. Plate1-I depicts the EQFS area subject to use restrictions.

Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites.[4] This policy was last updated in 2002, but is currently under review and a new update is expected in 2006. There have been no violations of the IC policy to date. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

8.3.5 <u>Five-Year Assessment</u>

Are the Remedies Functioning as Intended by the Decision Document?

Remedies are generally functioning as intended.

[4] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- The MCLs used to establish groundwater cleanup goals for the EQFS have not changed since the ROD.

Has Any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information calling the protectiveness of the remedy into question at this time.

Variances

No significant variances from the ROD have been noted to date.

Recommendations and Follow-Up Actions

The AS/SVE remediation system installed at Bldg 1060 has functioned as intended and COC concentrations in the groundwater have decreased. Groundwater sampling will continue biannually. There are no operational changes recommendations for these sites at this time.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review for the EQFS are shown in Table 8-5.

Table 8-5. Response to Recommendations from 2001 Five-Year Review for OU5 EQFS

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Long term natural attenuation and monitoring plan for Building 1060 West plume	Long term monitoring plan was submitted by CH2M Hill in 2003 and RAOs were achieved through active remediation	U.S. Army	2003	No
Include sampling at Apple Street in the long-term monitoring plan.	Three wells along Apple Street were added to the sampling program	U.S. Army	2002	No

8.4 Remedial Area 1A – Birch Hill Above Ground Storage Tanks

8.4.1 Overview

This source area, referred to as Remedial Area 1a, is located on Birch Hill in the northwest corner of Fort Wainwright (Figure 6-1). As part of the OU3 ROD, the Birch Hill Tank Farm area was divided into two areas: Remedial Area 1a, which dealt with the lead-contaminated soils surrounding the ASTs on Birch Hill; and Remedial Areas 1b, which dealt with the fuel contamination from the tanks, as well as several other sub-areas in the Birch Hill area. In order to provide more time to select appropriate cleanup goals and remedies for the lead-contaminated soils, Remedial Area 1a was transferred to OU5.

Remedial Area 1a covers an area of approximately 110 acres. There are sixteen ASTs on Birch Hill and the associated underground pipeline system. The chosen alternative in the ROD, signed in April 1999, consists of ICs. The entire area is fenced and signs are in place; the fence is inspected annually to ensure its integrity.

8.4.2 Background

Remedial Area 1a, also known as the Birch Hill Tank Farm, is located in the northwest corner of Fort Wainwright. The tank farm was constructed in 1943 beginning with the installation of fourteen 10,000 barrel bolted steel ASTs (301 through 314). In 1957 two 25,000 barrel and two 2,250 barrel welded steel ASTs (315 through 318) were installed. The ASTs are surrounded by containment berms constructed of compacted glacial sands and gravels with a berm drain on the down slope side. All of the tanks were emptied and cleaned in 1993.

Periods of use and dates related to the history of the Birch Hill Tank Farm contamination and remediation are included in Table 8-6.

Table 8-6. History of Regulatory Events at Birch Hill Tank Farm[a]

Event	Date
Fort Wainwright NPL listed	August 1990
FFA signed	March 1992
Remedial Investigation and Risk Assessment Reports submitted	October 1994
Feasibility Study submitted	April 1995
Proposed Plan submitted	April 1995
Record of Decision signed	January 1996, Revised April 1996
Remedial Design/Remedial Action Scope of Work submitted	February 1996
Design Analysis 35 percent Design submitted	April 1996
AS/SVE remediation systems installed at Building 1173 and Lazelle Road	Summer 1996
Design Analysis 60 percent Design submitted	May 1997
Lazelle Road system relocated to the Truck Fill Stand and the Building 1173 system expanded to cover Lazelle Road source area.	1997
Product recovery treatability studies initiated at the Birch Hill Tank Farm.	1998
Remedial Action Work Plan submitted	October 1998
Thaw Channel treatment system installed	1999
Product Recovery treatment system installed	2000
Preliminary Draft Remedial Action Report submitted	May 2001
First Five-Year Review signed	September 2001
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report submitted	September 2002
Fort Wainwright Construction Complete Received from the EPA	2002

[a] Information obtained from the OU5 ROD; Groundwater Extraction and Treatment Effectiveness Review (Oct. 2000); OU5, 1999 Monitoring Report

Physical Characteristics

The ground in the vicinity of the ASTs is almost entirely covered with vegetation. The elevation of Birch Hill ranges from 441 feet to 748 feet above mean sea level. No permanent surface water bodies are located on Birch Hill, but snow and ice melt water accumulate in the depressions and in the diked areas around the ASTs. No endangered or threatened species reside in the area.

History of Contamination

The soil surrounding the tanks is contaminated with lead, petroleum, and related constituents. Surface soil lead contamination may be the result of several historical tank maintenance activities, including tank bolt removal and replacement, cleaning sludge from the tank bottoms, and tank painting and stripping. Historically, bolts removed from the tanks during routine maintenance were cleaned with solvent to remove red lead pipe dope. The solvent, which contained lead from the pipe dope, was spread on the ground in areas surrounding the tanks. Since the majority of tanks were built as bolted tanks, numerous bolts are present. Sludge removed from the fuel tanks was buried or spread in the areas surrounding the tanks and may have also contributed to lead contamination in the surface soil. Painting and stripping of the tanks may have resulted in lead-contaminated paint chips in the nearby soil. Additionally, spills of fuels containing lead may have occurred throughout the tank farm's history, because the bolted steel tanks were subject to leaks.

Land and Resource Use

Land use at Remedial Area 1a is light industrial. The site is fenced to prevent entry and subsequent exposure to soils within the source area. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

8.4.3 <u>Remedy Selection</u>

Nature of Contamination

<u>Soil</u>

Remedial investigations in this area found lead and petroleum hydrocarbons in surface and subsurface soils, with the most significant levels within the bermed areas around the ASTs, decreasing with depth and distance from the tanks. Petroleum hydrocarbons (quantified as Jet A fuel) were detected in surface and subsurface soil at a maximum concentration of 5,500 mg/kg. Low levels of VOCs also were detected. The maximum total lead concentration reported in surface soil samples was 7,840 mg/kg, while the maximum leachable lead (TCLP) concentration was 5.4 mg/L.

Lead contamination of surface soil was found to be most significant directly adjacent to each tank, with lead levels decreasing with lateral distance from each AST. In addition, lead concentrations in subsurface soils were found to decrease to background levels at depths of 1 to 2 ft-bgs. Lead was the only inorganic analyte above screening levels and was determined to be the only COC for Remedial Area 1a under OU5.

Remedial Action Objectives

The RAOs for Remedial Area 1a are the same as those for the WQFS plus an additional objective for soil:

- Limit human health and terrestrial receptor exposure to lead-contaminated soil

ARARs

- There are no specific ARARs for the Remedial Area 1a
- To Be Considered (TBC) information for Remedial Area 1a addressing interim lead soil guidance and preliminary remediation goals is included in the ROD on Page 111

Cleanup Goals

Soil

- No direct contact for total lead concentration greater than 1,000 mg/kg

Numeric values for the cleanup goals established in the RODs are summarized in Appendix B.

Selected Remedy

Institutional Controls

The selected remedy for this site is ICs, which include land use restrictions, signage, and maintaining the existing fence. Plate1-I depicts the Remedial Area 1a area subject to use restrictions.

Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites.[5] This policy was last updated in 2002, but is currently under review and a new update is expected in 2006. There have been no violations of the IC policy to date. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

USAG-AK DPW maintains a GIS database with information on all of the contaminated sites on Post. The DPW is responsible for ensuring the implementation of ICs on Fort Wainwright. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

[5] Further details of the Army/Fort Wainwright IC policy can be found in the OU5 ROD, the U.S. Army Alaska Institutional Controls Standard Operating Procedures [(APVR-RPW [200-1)], and a Fall 2001 Memorandum on Institutional Controls [(APVR-RPW-EV-(200-1c)] from Major General Dean W. Cash, Fort Richardson, Alaska.

8.4.4 Status of Remediation

ICs are in place and there have been no violations to date. Annual inspections have been completed since 1999. Soil sampling was conducted around the tanks in 2005. The results indicated that no changes to the ICs or remedy are required. Land use restrictions have been incorporated into the Fort Wainwright master plan and GIS.

8.4.5 Five-Year Assessment

The OU5 ROD specified that sites that have waste left in place are subject to additional requirements under the five-year review. These requirements were identified as specifically applicable to Remedial Area 1a where natural attenuation is not projected to occur. These requirements are as follows:

- Collection and evaluation of all new lead-risk information and risk-assessment approaches for evaluating lead risks recommended by the state, EPA, or Army. This new information may result in a human health risk assessment for lead exposure being conducted for Remedial Area 1a.
- Collection and evaluation of current Army, EPA, and state regulations and policies on remediation of lead in soils, keeping in mind that total lead values at Remedial Area 1a reflect commingling of releases from numerous lead sources.
- Any other new information, draft or otherwise, or considerations relevant to an assessment of protectiveness for Remedial Area 1a.

The Army has collected and evaluated information, regulations and policies regarding lead in industrial soils published since the OU5 ROD signature. No new information that would affect human health or ecological decisions for Remedial Area 1a has been identified.

Are the Remedies Functioning as Intended by the Decision Document?

ICs are effectively preventing access to the contaminated soil areas.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

There are no known changes in exposure pathways or populations at risk.

Has Any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information calling the protectiveness of the remedy into question at this time.

Variances

There are no known variances affecting the protectiveness of the remedy at this location.

Recommendations and Follow-Up Actions

No changes in the remedial management of Remedial Area 1a are recommended at this time.

8.5 Other OU5 ROD Requirements

8.5.1 OB/OD Evaluation

The ROD specified that no less often than during the CERCLA five-year reviews, the Army will evaluate the OB/OD area. This evaluation will include review of the active range and any unexploded ordnance (UXO) within the OB/OD area and range, to determine whether ICs to restrict land use and protect human health and the environment are sufficient. The Army also will evaluate the status of RCRA rules and regulations for military munitions ranges and UXO to determine whether additional RCRA requirements must be met.

The Army's evaluation indicates that ICs for the OB/OD area remain protective. No new RCRA or munitions' rules have been promulgated specific to post-closure procedures for former OB/OD areas. The Army has evaluated whether delay of closure affects the OB/OD area and has determined it has not, because the range has not been closed and Fort Wainwright remains an active installation. Therefore the selected remedy remains protective.

8.5.2 Chena River Surface Water and Sediments

The CRAAP is a component of the selected remedies for OU5 source areas, and is not considered a source area in and of itself. As such, general response actions were not included in the OU5 ROD for Chena River sediment or surface water. Through the source area remedial investigation process, the Chena River was identified as the area most likely to be affected by multiple source area releases at Fort Wainwright, with the greatest potential for impact from the WQFS and EQFS.

The CRAAP was established to determine if impacts to the river had occurred from Fort Wainwright releases and to measure anticipated improvements in water and sediment quality over time, based on the effectiveness of selected remedies for the EQFS and WQFS areas. This program has provided information for optimizing treatment system operation. The program to date has consisted of sampling and analysis of surface water, sediments, and detritus (organic leaf litter); benthic macro-invertebrate toxicological studies and bioassays; and calculating reductions in contaminant load into the Chena River. The original aquatic assessment was performed in 1997 and 1998 and in earlier sampling where PAHs were found at concentrations exceeding sediment quality benchmarks downstream from the Former Retaining Structure. Additional study was performed in the 2002 CRAAP.

Major components of the assessment program were described as:

- Spring and fall collection of water, sediment, and detritus samples and analysis for contaminants of concern and water chemistry.
- Benthic macroinvertebrate study, including bioassay and toxicological analysis.
- Data collection (water quality, contaminant concentrations, contaminant loading and ecological conditions) and study of changes in aquatic organisms as a function of reduction in contaminant load into the river.
- Consider possible remedial actions if further evaluation of impacts to the river shows unacceptable risks to aquatic organisms.

8.5.3 Status of Aquatic Assessment Program

Pre-ROD

To determine whether actual impacts had occurred, assess their significance, and measure changes over time, the CRAAP was initiated in 1998. The assessment included collecting water, sediment, and detritus samples during the spring and fall and analyzing them for COCs and water chemistry. A second year of study was completed, with results reported during the first quarter of 1999. The ROD, signed in May 1999, noted ongoing aquatic assessment efforts and committed to continuation of the assessment, including benthic macroinvertebrate studies.

Post-ROD

The ROD included commitments to a post wide sampling program and the CRAAP. The CRAAP found evidence that contamination from the Fort Wainwright source areas was potentially adversely influencing biotic health in the Chena River ecosystem but did not prove that sediment toxicities caused changes in the benthic invertebrate communities of the Chena River.

Observations of sheens on the river or in sediment and detritus samples identified one of the seep areas (Seep Area in Segment D; see Figure 8-1) as being "the most conspicuous" contaminant outfall to the Chena River in the study area. Other, less conspicuous, sheens were observed downstream of the primary seep in the same study segment.

During summer 2000, polycyclic aromatic hydrocarbon (PAH) studies were conducted along the Chena River adjacent to the QFS in the vicinity of the sparge curtain and former retaining structure. These studies confirmed the presence of PAHs in the seeps.

The most recent study concluded that PAHs were ubiquitous, occurring in samples from the Seep Area and the Reference Area. The compounds included benzoic acid, phthalates, and phenols which together comprised an average of 86% of the total SVOCs (all compounds summed) in each sample. The relatively low concentrations of PAHs in the 2002 Seep Area samples, relative to those collected in 1997 and 1998 may reflect scouring flood events prior to the sampling in 2002. Samples collected in 1997 and 1998 were obtained during low-flow conditions during two dry years (1997 and 1998). It is unlikely that the apparent decrease in sediment concentrations of PAHs since 1998 is due to remediation efforts in OU5.

Recommendations and Follow-up Actions

The RPMs have determined that this program is no longer required and by signature of this document the program will be discontinued.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2001 Five-Year Review for the CRAAP are shown in Table 8-7.

Table 8-7. Response to Recommendations from 2001 Five-Year Review for the OU5 CRAAP

Recommendation/ Follow-Up Action from 2001 Five-Year Review	Action Completed	Parties Responsible	Date Completed	Affects Protectiveness (Yes/No)
Develop work plan for continued CRAAP monitoring	Decision was made by the RPMs to terminate the CRAAP	U.S. Army / EPA / ADEC	2005	No

8.6 Institutional Controls

ICs (Plate 1-I) are a component of the selected remedy for WQFS, EQFS, and Remedial Area 1a. In addition, the OU5 ROD established a comprehensive site wide approach to ICs at the Fort Wainwright NPL site for all source areas where the respective RODs specified ICs as an element of remediation.

8.6.1 Institutional Control Commitments in OU5 ROD

Major OU5 commitments to a site-wide IC program included the following:

- Develop SOPs to identify the objectives to be met by the restrictions, to identify all land areas under restriction, and to specify the particular restrictions, controls, and mechanisms to be used.
- Create and maintain a database and tracking mechanism to identify restricted land areas, objectives to be met by the restrictions, and the specific restrictions, controls, and mechanisms.
- Monitoring of SOP compliance at quarterly scheduled FFA meetings.
- As part of the O&M report for each OU, assess the condition of areas at Fort Wainwright subject to ICs. These inspections will determine the effectiveness and protectiveness of all ICs and designated land uses, and will ascertain whether the current land and groundwater uses in the area are consistent with the ICs and all MCLs outlined in the relevant decision document governing that site or OU. Results of any field inspection will be documented in the annual O&M report submitted for the OU pursuant to the remedial action report.
- USAG-AK will notify the EPA and ADEC immediately upon discovery of any unauthorized activity that is inconsistent with the IC SOPs. The USAG-AK will issue a stop work or stop activity notice on discovery of any unauthorized work. The stop work or stop activity notice will remain effective until the EPA, ADEC, and USAG-AK determine a plan of action to resolve the unauthorized change.
- USAG-AK will notify the EPA and ADEC at least 6 months in advance about any transfer, by sale or lease, of areas of Fort Wainwright that are subject to ICs, to ensure adoption of such additional measures as may be needed to assure continued compliance with ICs on such transferred property. Before actual transfer of land management responsibilities to the Bureau of Land Management or another federal agency or department or to a private party, the Army will provide

such transferee a written copy of installation master-planning documentation that identifies all ICs remaining in force.

- SOPs are a component of the five-year review process.

8.6.2 Status of Institutional Control Program

The Army has established an SOP and a GIS-based tracking system to ensure the land and use restrictions are enforced. The IC system has been incorporated into the post wide Master Plan, and compliance with ICs is reported in the Annual Monitoring Reports for each OU. The IC policy applies to all USAG-AK units and activities, Military and Civilian Support Activities, Tenants Organizations and agencies and Government and Civilian Contractors. In the fall of 2001, the Institutional Control Memorandum signed by Major General Cash dated February 1999, was updated to require a Work Authorization Permit for all groundwater and soils on USAG-AK lands. This revised memorandum, signed by the Commanding General, includes a section on areas with ICs mandated by a Record of Decision, and a section on areas where contamination is not suspected. Currently, all contracts that include intrusive activities require a Work Authorization Permit. The Permit will be updated to clearly alert the user about procedures to follow when potential contamination is encountered. The SOP for ICs includes a more detailed section on the procedures and responsibilities for incidents where potential contamination is found. This policy ensures that:

- No unauthorized intrusive actions take place at this source area,
- No potable water wells are installed on this source area, and
- No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit.

During the past few years, there have been numerous instances confirming the effectiveness of the IC policy at Fort Wainwright. One example is the Post Signal Battalion's project to install fiber optic lines throughout the installation (project name: OSCAR). Since the project's inception in 1998, signal personnel have coordinated their utility locates with Fort Wainwright environmental personnel. Environmental personnel have walked the proposed lines with the OSCAR personnel and negotiated relocation of the lines away from areas of highest contamination and/or active treatment systems. Environmental project work was coordinated with OSCAR work schedules to minimize disruptions to either project. Environmental staff met on a nearly weekly basis during the highest periods of OSCAR activities to expedite the dig permit approval processes and to ensure all parties understood what action would be taken if contamination was encountered.

Other examples demonstrating that the IC program is working include:

- DPW Environmental has been included as part of the planning team for the pre-construction and pre-design of housing units in the Fort Wainwright North Post area to ensure that potential areas of contamination be avoided to extent possible. Planning stage discussion has also resulted in agreement on the handling of contamination while continuing construction.

- The Federal Aviation Administration (FAA) is planning to construct a radar tower on Fort Wainwright, and chose the N4 site, a "No Further Action" site, as its desired location. Even though the site has been identified as needing no further action, the potential to encounter contamination still exists. FAA has met with the Environmental personnel and has been provided copies of the as-builts of former activities in the area and all known information on the N4 site. FAA will therefore be able to include provisions in the construction contract related to the potential to encounter contamination and steps to be taken by the contractor.
- When building the new hospital to be built on Fort Wainwright, the original preferred site was listed in the environmental GIS data base as requiring no further action, but indicated that construction debris tar remained in fairly large concentrations in this area. Rather than reopening the issue and attempting to build around the tar, another site was selected.
- Other requests for use of areas under ICs include the Birch Hill Tank Farm (OU3) and the inactive, fenced portion of the landfill (OU4). Requested uses have ranged from a horse stable to a skeet range. Review of each of these requests identified the pertinent IC restrictions and resulted in relocating the proposed activities to other sites while still in the planning stages.
- Corps project FTW299 planned to construct a building in the EQFS near existing Building 1060. This site was listed in the environmental GIS database as an IC requiring special dig permits because of contaminated soil and groundwater in the area. As a result, the design of the building was modified to require a vapor barrier.

Recommendations and Follow-Up Actions

Recommendations and follow-up actions for the IC program are shown in Table 8-8.

Table 8-8. Recommendations and Follow-Up Actions for IC Program

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	U.S. Army	EPA, ADEC	Update GIS - Ongoing	No
Make SOP coverage more inclusive (i.e., apply to tenants)	U.S. Army	EPA, ADEC	2006	No
Update IC Policy	U.S. Army	EPA, ADEC	2006	No

8.7 New Source Area, FTWW-102, Communications Site (Taku Gardens)

8.7.1 Overview

Historical photograph and record reviews indicated that the Communications Site was used as a salvage and reclamation yard as early as the mid-1940s. Temporary military barracks and offices were constructed in the early 1950s. The Electrical Power and Lighting Facilities Figure for LAFB indicate power and lighting was in place in 1958 that could support these site activities. A separate operation, the communication site, was located in the southwestern corner of the area. The previous locations of radar systems are visible in some aerial photographs. Little other information about the site is known, and researching is ongoing. After the buildings were dismantled, it appeared that salvage material was either removed or buried on site. The former communication site (southwestern corner) was developed into personal use garden plots, and the remaining area allowed to return to its natural state. The entire site encompasses approximately 54 acres.

The site was selected for future military family housing in 2002-2003. Pre-construction environmental samples were taken in late 2003 and again in 2004 and 2005. These results indicated limited low-level PCB detections. Geophysical testing was also done during this time frame; results indicated several large areas of buried metal debris.

8.7.2 Background

In June 2005, while undertaking construction activities, an area of petroleum contamination was discovered in the northwestern corner of the site. The appropriate State authorities were notified and became involved with the disposition of the contaminated soils.

In July 2005, while excavating for foundations in the southwestern corner of the site, an odor was detected by workers; the excavation ceased and environmental sampling was conducted. Results indicated high levels (up to 111,000 mg/kg) of PCB contamination, and on 8 August 2005, the Fort Wainwright RPMs for EPA and ADEC were notified via email of the findings and given a summary of the analytical results. As of that date, EPA and ADEC became actively involved in the site management and decision making for actions at this site. The protection of workers and nearby residents was the highest priority. A plan to determine the extent of the PCB contamination was developed and approved by the agencies. The plan consisted of the collection of surface soil samples, as well as wipe samples of contractor equipment, playground equipment and nearby houses. Temporary groundwater monitoring wells were installed to determine the migration potential of the PCBs. Soil borings, field screening and laboratory analyses were also included in the plan. The immediate area where PCBs were first discovered was fenced and posted as off limits. Soil piles from the excavation were properly covered, and dust control measures were put in place to ensure that contamination did not spread beyond the suspected source area.

Also in August 2005, the larger perceived area of contamination, corresponding to the total footprint of the communication site, was fenced off and signs posted restricting access; this area became known as the Exclusion Zone. The area fenced is approximately five (5) acres and encompassed proposed housing unit numbers 50 through and including 59. It was also during this time that the concern of the potential for PCB contamination spread throughout the site, was brought to light; the USAG-AK Commander shut down construction and the site was evacuated, with the exception of environmental investigative workers, on 30 Aug 2005.

A media release to the public of the Fairbanks area was disseminated on 31 Aug 2005 by the Fort Wainwright Commander, and EPA and ADEC were invited to attend. In addition, a public meeting was held on 6 Sep 2005, to inform residents and other interested public members of the concerns at the site and the reasons behind the construction stoppage. The EPA and ADEC RPMs were important participants in this meeting. Information was given about PCBs and potential PCB exposures, and the Command agreed to sample neighboring houses, playgrounds, and anything else residents may be concerned with. During this time frame, the decision was made by the Command to remove the 10 houses in the Exclusion Zone permanently from the planned housing.

On September 20, 2005, removal of approximately 230 cy of soil with the highest known contaminant levels were removed and shipped out of state for disposal. The remaining PCB soils were stockpiled on the house 52 pad and covered. Suspected POL contaminated soils were originally stockpiled near the northeastern edge of the site, but were moved to a state approved POL storage cell area within the DRMO yard for secure storage prior to appropriate treatment and disposition for POL contaminated soils.

Throughout the winter of 2005-2006, a thorough review was conducted of the historical uses of the site, as well as field notes and photographs taken during construction. As part of this review process, it was noted that many areas containing different types of metal debris, what appeared to be stained soils, and drums, were encountered during the initial construction process. Based on this information, the Army, EPA and ADEC determined a site-wide investigation was required to fully determine the nature and extent of contamination that may be on site in addition to the already known and permanently fenced PCB Exclusion Zone area.

In February 2006, a meeting was held with the Deputy Garrison Commander and the RPMs from EPA and ADEC. During this meeting, it was determined that since research indicated this area was once a military salvage area, that the Command would guarantee that the appropriate investigation would occur and no houses would be occupied until the investigation has been completed and the site is deemed safe for residential use. In March 2006, the Army developed a matrix and site map of areas of potential concern. The matrix contained locations of concern, identified primarily through review of the field notes and pictures, as well as potential COCs. A PSE work plan was developed to install test pits to determine the extent of any potential remaining metal debris, installation of groundwater monitoring wells, additional sampling in the Exclusion Zone, and soil contamination investigations. Throughout the early stages of the PSE, there has been full involvement and concurrence from EPA and ADEC.

To be protective, ordnance experts were hired as part of the PSE work plan to oversee the test pit investigation. Several munitions constituents were found in both the test pits and debris piles from construction activities. Environmental and ordnance experts reviewed the materials from the piles; when an unidentifiable or potential munitions debris scrap was found, military ordnance experts were called to the site for a final decision on scrap disposal or removal for detonation.

The Taku Team, consisting of individuals from EPA, ADEC, the DPW, and Alaska and Seattle Districts Corps of Engineers, have been working together to determine how construction could continue during the investigation phases. Weekly meetings are held to coordinate construction and investigative work, and the teams have been working together for several months to maintain progress on both fronts. It has been determined by the Command that due to the nature of the environmental investigation, no houses will be occupied until the investigation has been completed and the site is deemed safe for residential use.

The Army has been working under the framework of CERCLA and the FFA since the discovery of contamination at the Communications Site with full input from EPA and ADEC. In accordance with the FFA, the current phase that the Project is in the PSE. Due to the unknown areas of contamination, both the PSE 1 and 2, are being conducted concurrently. This site requires an extensive historical investigation as well as collection of field data to determine where contamination might exist.

The FFA as written establishes the procedural framework required for a newly discovered source area like this. The purpose and scope defined within the FFA will facilitate confidence that this site is investigated and remediated in accordance with applicable laws. After completion of the PSE, the RPMs will be able to set the schedule of the primary and secondary deliverables for the remedial investigation (RI), risk assessment and consequent feasibility study (RI/FS), if such actions are deemed necessary.

Documents received and approved by the agencies include:

- Draft Preliminary Source Evaluation Narrative Report, August 2006 (Oasis)
- Field Sampling Plan, Revision 3, August 2006 (North Wind)
- Final Revision, Delineation and Remediation of Contaminated Soil, Groundwater and Debris at Stryker Brigade Cantonment Areas, Accident Prevention Plan, August 2006 (North Wind)
- Accident and Prevention Plan and Site Safety and Health Plan, Jul/Aug 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens) Work Plan Addedum, Spring 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens), Field Data Report February 2006 (North Wind)
- Draft Revision 1, Site Characterization and Remediation Work Plan, Fort Wainwright, Alaska, June 2005 (North Wind)

Response to Date

See Table 8-9 (at end of section) for a summary of significant actions taken to date at this site.

The site will remain entirely fenced, along with the Exclusion Zone fence within the site-wide fence.

Table 8-9. Summary of Sampling Done to Date at the Communications Site

Date	Task	Analytical Parameters	Where Results Reported
2005 June	Odor detected in Bldg 52 area; 9 samples taken	6 full suite TCLP (with the exclusion of herbicides) plus one sample for 16 PAHs and BTEX	Taku Gardens Field Data Report, February 2006
		3 PCBs	
2005 July	18 soil borings and 3 temporary groundwater wells installed in suspect POL area of site	Soil & Groundwater: VOCs, SVOCs, DRO, & PCBs	Taku Gardens Field Data Report, February 2006
2005 July	5 Additional soil samples taken in Bldg 52 area where PCBs discovered initially	VOCs, SVOCs, PCBs	Taku Gardens Field Data Report, February 2006
2005 Aug & Sept	Wipe samples: in construction area	PCBs	Taku Gardens Field Data Report, February 2006
2005 Aug & Sept	Wipe samples: outside construction area, nearby houses and playgrounds, and the School Age Services bordering the site	PCBs & dioxins / dibenzofurans (DFs)	Taku Gardens Field Data Report, February 2006
2005 Aug & Sept	Soil piles in the construction zone	PCBs	Taku Gardens Field Data Report, February 2006
2005 Aug & Sept	765 soil samples field screened (surface)	Field screened for PCBs	Taku Gardens Field Data Report, February 2006
2005 Sept	8 temporary groundwater wells	VOCs, SVOCs, GRO, DRO, RRO, PCBs, total analyte list (TAL) Metals, & Pesticides	Taku Gardens Field Data Report, February 2006
2005	POL-contaminated soil piles	GRO, DRO, RRO, & BTEX	WCC Construction Field Screening Report (due Feb 2007)
		Field screened for PCBs	Taku Gardens Field Data Report, February 2006

Table 8-9. Summary of Sampling Done to Date at the Communications Site

Date	Task	Analytical Parameters	Where Results Reported
2005-2006	Historical records and photograph review, including field notes and photographs taken by construction contractor's environmental sampler	N/A	The 2006 work conducted on site was based largely on these findings. Results will be part of the PSE2 document (draft late 2006, final eary 2007).
2005 Sept	3 permanent groundwater monitoring wells delineating the Exclusion Zone	VOCs, SVOCs, GRO, DRO, RRO, PCBs, Chlorinated Pesticides, & 23 TAL Metals	Taku Gardens Field Data Report, February 2006
2006 July		VOCs, SVOCs, GRO, DRO, RRO, PCBs, Chlorinated Pesticides, 28 Metals, & DFs	Preliminary results no later than November 2006 meetings
2006 May-Jul	30 test pits, approximately 50 cy each, to look for buried debris based on preconstruction geophysical surveys completed	VOCs, SVOCs, GRO, DRO, RRO, PCBs, 28 Metals, Chlorinated Pesticides, Chlorinated Herbicides, Explosives, pH, Anions, & Nitrate-Nitrite	Preliminary results no later than November 2006 meetings
2006 Jun-Jul	Finding of munitions and explosives of potential concern during test pit excavations; disposal of all findings through military EOD personnel. Locations of findings shown on site map.	N/A	31 July 2006 Tech Memo from North Wind; discussed at August 2006 meeting; will be detailed in PSE2 Report
2006 July & Aug	POL contaminated soil piles (moved from site 2005) stored at DRMO yard pending analytical results (for disposal)	VOCs, SVOCs, GRO, DRO, RRO, PCBs, 28 Metals, Chlorinated Pesticides, & Explosives	Preliminary Results NLT November 2006 meetings

Table 8-9. Summary of Sampling Done to Date at the Communications Site

Date	Task	Analytical Parameters	Where Results Reported
2006 Sept	42 Soil Gas (goresorbers)	VOCs, & select SVOCs (the more volatile ones)	Preliminary Results NLT November 2006 meetings
2006 Sept	10 permanent groundwater monitoring wells Site-wide (does **not** include the Exclusion Zone wells)	VOCs, SVOCS, GRO, DRO, RRO, 28 Metals, Chlorinated Pesticides, Nitroaromatics & Nitramines (Explosives), Perchlorate, & Anions	Preliminary results NLT November 2006 meetings
2006	200 soil borings (geoprobes)	These 200 soil borings include both site-wide and PCB exclusion zone (but do not include the noise berms to the east which were hand augered). Exclusion Zone samples were field screened with ~10% to lab (PCBs only); site-wide samples were tested for: VOCs, SVOCs, 28 Metals, Chlorinated Pesticides, Chlorinated Herbicides, Explosives, & pH.	Preliminary results NLT November 2006 meetings
2006	Geophysical to verify remaining debris post construction	N/A	Preliminary results discussed at August 2006 meeting; additional findings NLT November 2006 meetings
2006	Debris piles sampled to ensure proper disposal method	VOCs, SVOCs, GRO, DRO, RRO, PCBs, 28 Metals, Chlorinated Pesticides, Chlorinated Herbicides, Explosives, pH, Anions, & Nitrate-Nitrite	Preliminary Results NLT November 2006 meetings

8.7.3 Status of Site

The Fort Wainwright Federal Facility Agreement is in the process of being modified by the agencies' Remedial Project Managers to reflect inclusion of this site into the Agreement. The modification will ensure that the CERCLA requirements and milestones are captured for the short and long-term protectiveness of this site. In addition, the Army agrees through its signature on this document that no houses will be occupied until the site is fully investigated and deemed safe for residential use and the site access restrictions are lifted by the RPMs.

Any intrusive work at the site has been limited to areas previously excavated, and must be approved by both ADEC and EPA prior to work commencing. This is to ensure the continued safety of site workers and nearby residents.

As of this document, information is being gathered in the PSE2 report. During the winter of 2006-07, the agencies will review all information and determine the future requirements for this site. The PSE2 will document all actions that have been taken at the site, and will provide a recommendation of whether an RI is necessary. Upon review of the PSE2, the RPMs will make a final determination if an RI/FS is needed. Other constituents of concern would be added to the RI Work Plan if results indicate they are warranted. The RI Work Plan would lead into the RI work, a Feasibility Study, and a Record of Decision for this site, but could also include Interim Removals if determined feasible.

8.7.4 Protectiveness

The following is a summary to date of the following actions the Army has taken to enhance protectiveness pending the requirement for an approved RI/FS Work Plan:

- A Time Critical Removal of 230 cy of PCB contaminated soil
- Installation of chain link fence, first around the 5 acre PCB exclusion zone, then the entire 54 acres
- Signage and patrols to restrict access and warn of hazardous materials
- Clean all construction equipment used in PCB area
- Maintain dust control measures in PCB area, such as covering and watering
- Monitor groundwater around perimeter of the site, both shallow aquifer and Post supply wells- to date no PCBs detected
- Hold public meeting and issue fact sheets to update public
- Suspension of all subsurface excavation and construction without ADEC and EPA approval
- Use of UXO trained escorts during site investigation
- No occupation of the housing area until the site is fully investigated and deemed safe for residential use

While this new information could call into question the protectiveness at the site, it does not do so in the short term since workers are protected and occupancy has been prohibited, and in the long term those controls will be maintained as long as necessary to ensure protectiveness.

8.7.5 Recommendations and Follow-up Actions

Recommendations for this site are shown in Table 8-10.

Table 8-10. Recommendations and Follow-Up Actions for Communications Site

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Preclude occupancy of houses until the site is fully investigated and deemed safe for residential use and the site access restrictions are lifted by the RPMs	U.S. Army	EPA / ADEC	Ongoing	No
Conduct an RI/FS for the site, if the RPMs decide that it is necessary based on the results of the PSE2	U.S. Army	EPA / ADEC	Ongoing	No
Modify or supplement the FFA to add the Communications Site source area as a new OU	U.S. Army	EPA / ADEC	In Progress	No

9 SITE-WIDE SUMMARY AND RECOMMENDATIONS

9.1 General

9.1.1 ROD Commitments are Being Met

Management of Fort Wainwright NPL site remediation under the FFA has been very effective. This effectiveness translates into a good rate of progress implementing the remedial actions specified in the RODs and is in the best interest of the public and the environment. This effectiveness also translates into best use of public resources, i.e. a greater proportion of funding for RD/RA/LTM is focused on remediation (as opposed to transactional costs) than has been the case at many other NPL sites.

9.1.2 Public Information Repositories

Two of the three Fort Wainwright public information repositories were visited on June 7, 2006 (the Post library was closed on the day of the visit, but was visited on July 7, 2006). The visits found the repositories to be generally meeting CERCLA requirements and public needs. A status report on the five-year review site visits is included in Appendix C of this report. The repository site visit report includes several specific recommendations for enhancing the repositories and potentially simplifying maintenance of the administrative record at these locations.

9.1.3 Institutional Controls

All five Fort Wainwright RODs specify ICs to ensure protection of human health and the environment. As of February 1999, Fort Wainwright formally established standard operating procedures to fully comply with the commitments made in the RODs and to ensure the integrity of ICs specified in the RODs. In the fall of 2001, the 1999 Institutional Control Memorandum signed by Major General Cash was updated to require a Work Authorization Permit for all groundwater and soils on USAG-AK lands. This revised memorandum, signed by the Commanding General, includes a section on areas with ICs mandated by a Record of Decision, and a section on areas where contamination is not suspected. Currently, all contracts that include intrusive activities require a Work Authorization Permit. The Permit will be updated to clearly alert the user about procedures to follow when potential contamination is encountered.

Implementation of ICs involving access and use limitations requires maintaining institutional boundaries in the USAG-AK GIS database. These boundaries are not specified in the RODs and are subject to routine review and revision to ensure continued protectiveness of the ICs.

Recommendations to update IC boundaries appear in the OU- and source area-specific recommendations summarized in this section.

9.1.4 Groundwater Monitoring

Data from the groundwater monitoring program at each source area should be evaluated as it is reported to assure no off-site migration of contaminants and to evaluate the progress of natural attenuation. Where appropriate, it is recommended that the groundwater contours at each source area be plotted and evaluated during each monitoring event to ensure that the assumptions used in assessing the groundwater monitoring data reflects where the monitoring wells are located relative to the source area. This will enable changes in flow patterns to be recognized and appropriate actions taken.

9.2 Operable Unit and Source Area Specific

Table 9-1 summarizes the response to recommendations made in the 2001 Five-Year Review, and Table 9-2 summarizes the recommendations and follow-up actions from OU and source area sections of this report.

Table 9-1. Response to Recommendations from 2001 Five-Year Review

Operable Unit	Source Area	Recommendations / Follow-Up Actions from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
1	801 Drum Storage Area	Redraw IC boundaries to more closely coincide with the contaminated area.	ICs for Fort Wainwright were revised in 2002; the newly established IC boundary for this site is shown in Plate 1-I	U.S. Army	2002	No
2	Building 1168 Leach Well	Redraw the IC boundary around the entire source area (CERCLA and 2-PTY).	The IC boundary was changed to encompass the area of potential exposure to both Leach Well and 2-PTY site contamination	U.S. Army	2002	No
	DRMO Yard	Redraw the IC boundary to extend to the north to encompass the groundwater plume.	The IC limits were re-drawn in 2002 to include the area north of wells AP6807 and AP-6804. Natural attenuation monitoring began in 2004	U.S. Army	2002	No
3	Birch Hill Tank Farm (Remedial Area 1b)	Further characterization of aquifer interactions	Several studies have been conducted since the 2001 Five-Year Review to better characterize the aquifer in this area, including: pump tests, dye-tracer studies, GW modeling, and geophysical surveys	U.S. Army	Ongoing	No
		Gather data on fate and transport of DCA and EDB.	Several monitoring wells were installed along CANOL Road to evaluate the potential for contaminant migration in this direction and to verify groundwater model predictions. Additional groundwater modeling is planned. Also, based on the outcome of discussions for the BH Summary Report we may find that it is not possible to characterize the Birch Hill DCA or EDB fate and transport.	U.S. Army	2005/Ongoing	No
	ROLF & Valve Pits (Remedial Area 2)	Groundwater monitoring for lead	Analysis of lead was added to the parameter list for all monitor wells at the six ROLF sites in 2002; lead sampling is currently conducted at the Central Header and former Bldg 1144 sites	U.S. Army	2002	No
	FEP Mileposts 2.7, 3.0, & 15.75 (Remedial Area 3)	No operational changes were recommended				

Table 9-1. Response to Recommendations from 2001 Five-Year Review

Operable Unit	Source Area	Recommendations / Follow-Up Actions from 2001 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
4	Landfill	Change IC boundary to cover area where groundwater plume from landfill leachate affects downgradient aquifers.	ICs for Fort Wainwright were revised in 2002; the newly established IC boundary for this site is shown in Plate 1-I	U.S. Army	2002	No
	Coal Storage Yard	Evaluate need for treatment system extension to under coal pile.	Soil sampling beneath the coal pile was completed in 2002; no contamination was found to indicate expansion of the system was necessary	U.S. Army	2002	No
		Relocate ICs to cover area where groundwater plume from CSY affects downgradient aquifer.	ICs still in place; Downgradient wells being monitored annually	U.S. Army	2002	No
5	WQFS	Incorporate appropriate sampling of area downgradient of AS Curtain along the Chena River (seep area) into the LTM Plan of OU5	Monitor wells were installed between the AS curtain and the Chena River to monitor groundwater prior to entering the river.	U.S. Army	2002	No
		Incorporate appropriate sampling for EDB in WQFS groundwater into the OU5 LTM plan.	EDB was added to the sampling parameters for the site.	U.S. Army	2002	No
	EQFS	Long term natural attenuation and monitoring plan for Building 1060 West plume	Long term monitoring plan was submitted by CH2M Hill in 2003 and RAOs were achieved through active remediation	U.S. Army	2003	No
		Include sampling at Apple Street in the long-term monitoring plan.	Three wells along Apple Street were added to the sampling program	U.S. Army	2002	No
	Birch Hill ASTs (Remedial Area 1a)	No operational changes were recommended				
	OB/OD	No operational changes were recommended				
	Chena River Surface Water & Sediments	Develop work plan for continued CRAAP monitoring	Decision was made to terminate the CRAAP	U.S. Army	2005	No

Table 9-2. Current Recommendations and Follow-up Actions at All Operable Units

Operable Unit	Source Area	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
1	801 Drum Storage Area	No operational changes are recommended at this time.				
2	Building 1168 Leach Well	No operational changes are recommended at this time.				
2	DRMO Yard	Continue to evaluate sampling results and natural attenuation parameters to determine if the system should be turned back on	U.S. Army	EPA / ADEC	On-going	No
3	Birch Hill Tank Farm (Remedial Area 1b)	Complete Birch Hill Tank Farm Summary Report	U.S. Army	EPA / ADEC	2007	No
3	Birch Hill Tank Farm (Remedial Area 1b)	Pursuant to authority granted by Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), make every reasonable effort to obtain a signed access agreement for the Army, its contractors, agents, U.S. EPA, and ADEC to install and monitor new wells on the former Bentley property. The access agreement should provide that no conveyance of title, easement, or other interest in the property shall be consummated without provisions for the continued operation of such wells.	U.S. Army	EPA / ADEC	When roads and infrastructure of housing development has been completed	No
3	ROLF & Valve Pits (Remedial Area 2)	No operational changes are recommended at this time.				
3	FEP Mileposts 2.7, 3.0, & 15.75 (Remedial Area 3)	Milepost 15.75 should be considered for NFA	U.S. Army	EPA / ADEC	2007	No
4	Landfill	No operational changes are recommended at this time.				
4	Coal Storage Yard	Site has been recommended for NFA	U.S. Army	EPA, ADEC	2007	No

Table 9-2. Current Recommendations and Follow-up Actions at All Operable Units

Operable Unit	Source Area	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
5	WQFS	Continue the operation of the sparge curtain and seasonal use of the boom along the Chena River.	U.S. Army	EPA, ADEC	On-going	No
		Continue sampling groundwater biannually. Wells within and downgradient of the HWL and SA treatment system will be sampled as part of a contaminant rebound / natural attenuation monitoring program.	U.S. Army	EPA, ADEC	On-going	No
	EQFS	No operational changes are recommended at this time.				
	Birch Hill ASTs (Remedial Area 1a)	No changes in the remedial management of Remedial Area 1a are recommended at this time.				
	OB/OD	No changes in the remedial management of the OB/OD are recommended at this time.				
	Chena River Surface Water & Sediments	Discontinue the CRAAP	U.S. Army	EPA, ADEC	N/A	No
	ICs Program	Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	U.S. Army	EPA, ADEC	Update GIS - Ongoing	No
		Make SOP coverage more inclusive (i.e., apply to tenants)	U.S. Army	EPA, ADEC	2006	No
		Update IC Policy	U.S. Army	EPA, ADEC	2006	No
	Potential New Source Area (Communications Site)	Preclude occupancy of houses until the site is fully investigated and deemed safe for residential use and the site access restrictions are lifted by the RPMs	U.S. Army	EPA / ADEC	Ongoing	No
		Conduct an RI/FS for the site, if the RPMs decide that it is necessary based on the results of the PSE2	U.S. Army	EPA / ADEC	Ongoing	No
		Modify or supplement the FFA to add the Communications Site source area as a new OU	U.S. Army	EPA / ADEC	In Progress	No

10 PROTECTIVENESS STATEMENTS

Table 10-1, on the following page, summarizes OU and source area information from the preceding sections, used to formulate protectiveness statements[1].

OU1 801 Drum Burial Site

The remedy at OU1 is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to, or ingestion of, contaminated groundwater.

OU2 Building 1168 Leach Well and DRMO Yard

The remedy at OU2 is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to, or ingestion of, contaminated groundwater.

OU3 Birch Hill Tank Farm (Remedial Area 1b); ROLF (Remedial Area 2); and FEP Mileposts 2.7, 3.0, and 15.75 (Remedial Area 3)

The remedy at OU3 is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to, or ingestion of, contaminated groundwater.

OU4 Landfill and Coal Storage Yard

The remedy at OU4 is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to, or ingestion of, contaminated groundwater.

OU5 Quartermaster Fueling System, Birch Hill Tank Farm (Remedial Area 1a), Chena River, and Institutional Controls Program

The remedy at OU5 is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to, or ingestion of, contaminated groundwater.

[1] Comprehensive Five-Year Review Guidance (EPA 2001).

Table 10-1. Protectiveness Statement Basis

Operable Unit	Source Area	Question A Is the remedy functioning as intended in the decision documents?	Question B Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives still valid?	Question C Has any other information come to light that could call into question the protectiveness of the remedy?	Is the remedy protective in the short term?	Is the remedy protective in the long term?
1	801 Drum Burial Site	Yes. Although COC concentrations have *not decreased, they are stable and* contaminants are not moving off-site	Yes	No	Yes	Yes
2	Building 1168 Leach Well	Yes	Yes	No	Yes	Yes
	DRMO Yard	Yes	Yes	No	Yes	Yes
3	Birch Hill Tank Farm (Remedial Area 1b)	Yes. Groundwater contaminant concentrations and the base of Birch Hill and off-post locations are generally at or below remedial goals. Since the shut-down of the Birch Hill Product Recovery System in 2003, significant free-product thickness has not been observed. Contamination underlying Birch Hill is continuing to be evaluated.	Yes	No	Yes	Yes
	ROLF & Valve Pits (Remedial Area 2)	Yes	Yes	No	Yes	Yes
	FEP Mileposts 2.7, 3.0, & 15.75 (Remedial Area 3)	Yes. Although COCs are not decreasing at the Milepost 2.7 and 3.0 sites, contaminants do not appear to be moving off-site.	Yes	No	Yes	Yes
4	Landfill	Yes. While COC concentrations have not decreased, they appear to be stable and ICs remain protective of human health and the environment	Yes	No	Yes	Yes
	Coal Storage Yard	Yes	Yes	No	Yes	Yes
5	WQFS	Yes	Yes	No	Yes	Yes
	EQFS	Yes	Yes	No	Yes	Yes
	Birch Hill ASTs (Remedial Area 1a)	Yes	Yes	No	Yes	Yes

11 NEXT REVIEW

The next Fort Wainwright Five-Review will be conducted in 2011.

Recommendations for that review include:

Some contaminants that currently have risk-based remedial action goals are candidates for federal MCLs. The next five-year review should follow up on the status of these contaminants:

- Aldrin and dieldrin are both COCs listed in the OU1 ROD. State of Alaska MCLs have been established for both, but they are still listed on the EPA Safe Drinking Water Act drinking water Contaminant Candidate List (CCL); federal MCLs may be established for these contaminants in the future.

- The contaminant 1,1,2,2-PCA is listed as a COC in the OU4 ROD. State of Alaska MCLs have been established for this chemical, but it is still listed on the federal drinking water CCL; a federal MCL may be established for this contaminant in the future.

The next review should include assessment of the status follow-up actions identified in this report.

12 REFERENCES

This five-year review focused on understanding commitments made in the RODs, the status of remedial actions undertaken in response to the RODs, and the continued protectiveness of the remedial actions specified in the RODs. The individual RODs were the starting points for the reviews of compliance with the RODs, remediation progress to date, and protectiveness. To the extent possible, the review made use of the most recent summary documents available, augmenting the information in those summaries with information from earlier reports and, in some cases, with knowledge or information not yet included in reports. Much of the review focused on post-ROD reports, though pre-ROD documents were also consulted as needed to understand the history of contamination and remediation at the source areas. Appendix A provides a listing of the RODs and related documents and post-ROD reports available at the time of this five-year review. Key references used by reviewers are indicated in the table. Specific references that were called out in the text of the report are provided in the listing below.

Alaska Department of Environmental Conservation (ADEC), 2003. Additional Cleanup Values, Technical Memorandum 01-007, November 24, 2003.

ADEC, 2005. 18 AAC 75. Oil and Other Hazardous Substances Pollution Control, as amended through October 16, 2005

ADEC, 2006. 18 AAC 70. Alaska Water Quality Standards, as amended through March 23, 2006.

ADEC, 2006. 18 AAC 80. Drinking Water, as amended of August 19, 2006.

CH2M Hill, 2004. CLOSES Evaluation 801 Drum Burial Site, Operable Unit 1, Fort Wainwright, Alaska, April.

ENSR, 1998, 1999, 2000, and 2001. Annual Progress Reports Rhizosphere-Enhanced Phytoremediation Treatabiltiy Study, Fort Wainwright, Alaska.

ENSR, 2006. 2005 Annual Groundwater Monitoring Report 801 Drum Burial Site, Operable Unit 1, Fort Wainwright, Alaska, March.

Environmental Protection Agency (EPA), 2000. Procedures for Completion and Deletion of National Priority Sites and Update, OSWER Directive 9320.2-09A-P, January.

EPA, 2001. Comprehensive Five-Year Review Guidance, EPA 540-R-01-007, OSWER No. 9355.7-03B-P, June 2001.

EPA, 2002. Sampling at 801 site, Operable Unit 1, Memorandum from Dianne Soderlund to Administrative Record File, October 30, 2002.

EPA, 2002. 40 CFR 141. National Primary Drinking Water Regulations, revised as of July 1, 2002.

Fairbanks Environmental Services, Inc. (FES), 2003. Milepost 2.7 and 3.0 Treatment Cell Decommissioning and Sampling Plan, Operable Unit 3, Fort Wainwright, Alaska, January.

FES, 2006. 2005 Monitoring Report, Operable Unit 3, Fort Wainwright, Alaska, March.

Rockwell Environmental Services, 1997. Site Assessment Report, Remove Soil at Burn Pits, Fort Wainwright, Alaska, January.

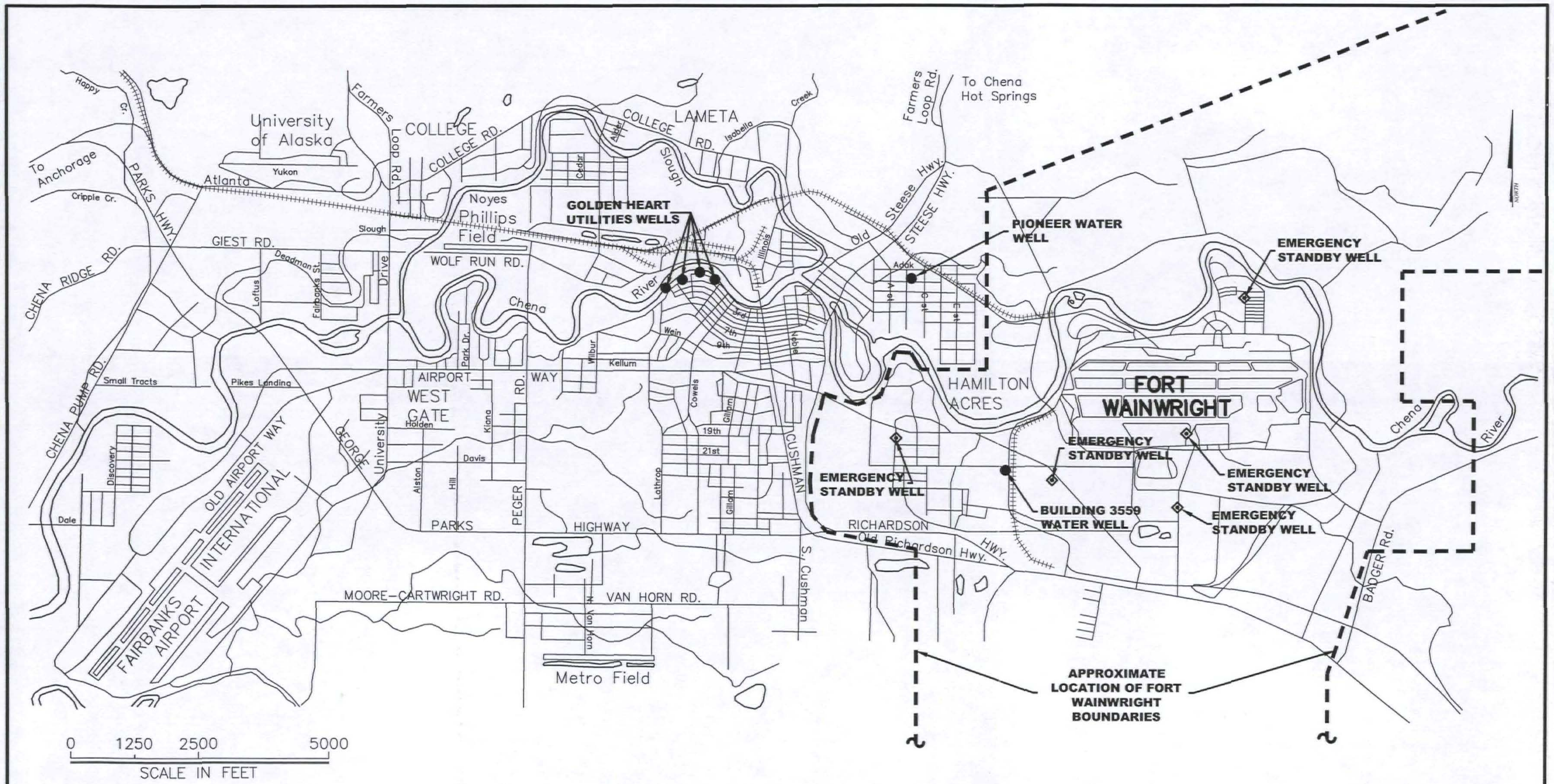
U.S. Army, 1996. Record of Decision for Operable Unit 3, Fort Wainwright, Alaska, April.

U.S. Army, 2000. Groundwater Extraction and Treatment Effectiveness Review, Fort Wainwright, Alaska, October.

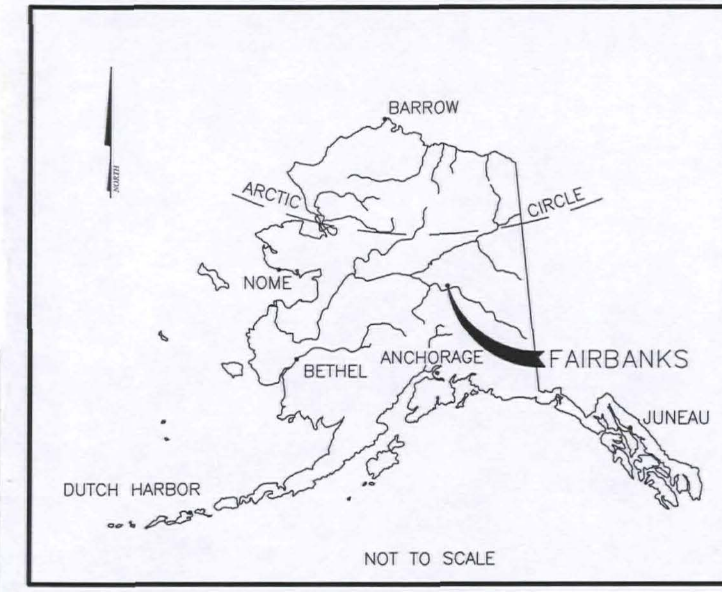
U.S. Army, 2001. Interim Army Guidance for Conducting CERCLA Five-Year Reviews.

U.S. Army, 2002. Explanation of Significant Differences, Operable Unit 3, Fort Wainwright, Alaska, November.

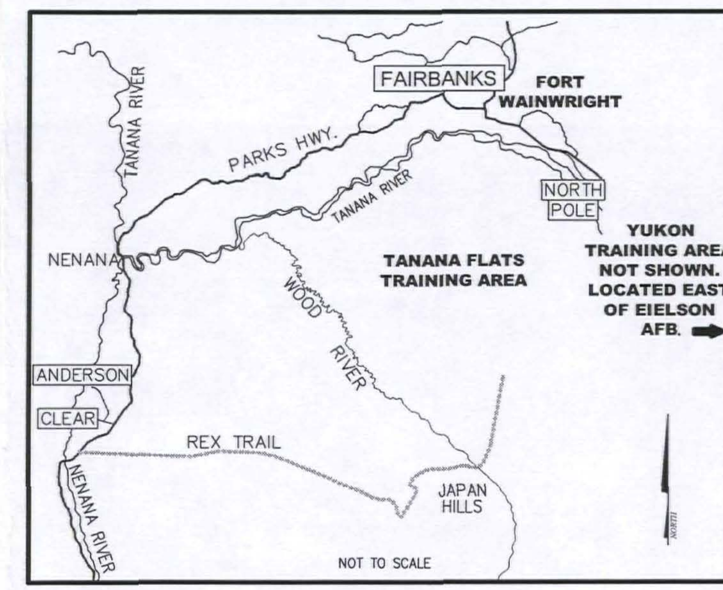
Figures



Fairbanks and Fort Wainwright Site Map



Location Map



Vicinity Map

LEGEND

- ● DRINKING WATER WELL LOCATION
- ◈ EMERGENCY STANDY WELL LOCATION. USED PRIMARILY FOR FIRE SUPPRESSION

ARMY ENVIRONMENTAL CENTER | CORPS OF ENGINEERS ALASKA DISTRICT

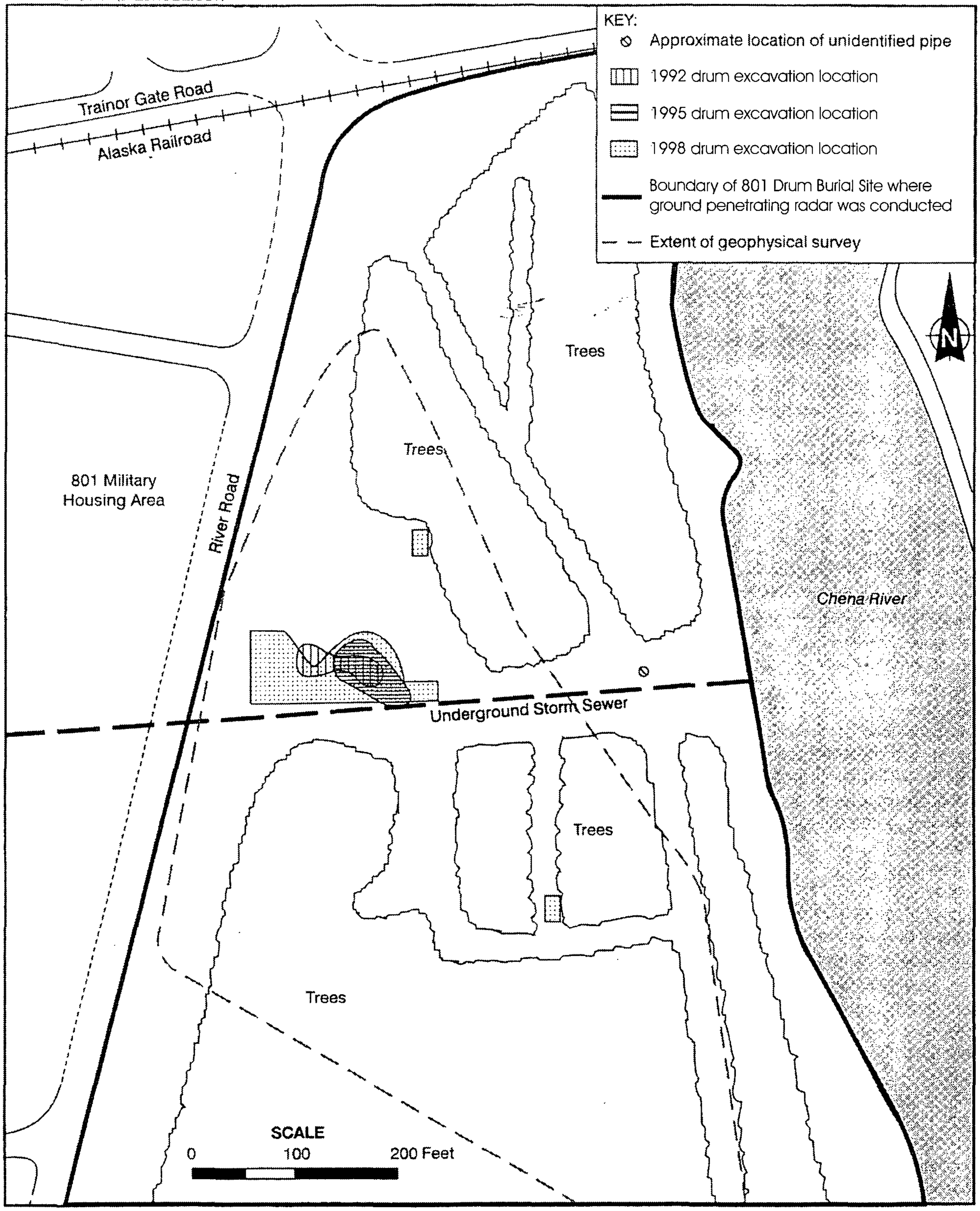
Fort Wainwright and Surrounding Areas

Five Year Review
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, Second 5 Year Review	3-1	9/06

789AF

02: JT2901\A704\JT29ROD2.CDR



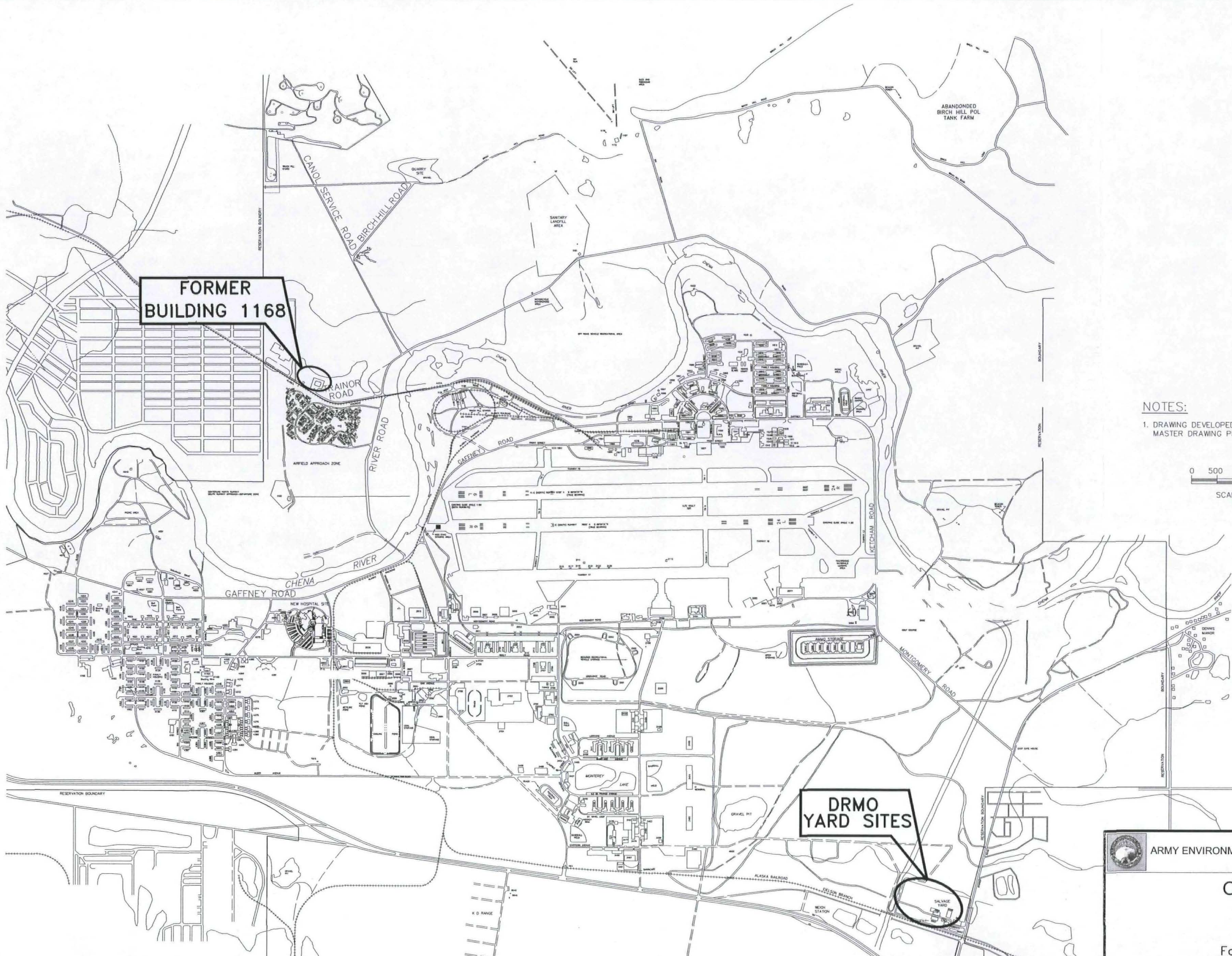
ARMY ENVIRONMENTAL CENTER | CORPS OF ENGINEERS ALASKA DISTRICT

801 Drum Burial Site

Five Year Review
Operable Unit 1
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
First 5-Year Review 9/2001	4-1	9/06

200C



NOTES:

1. DRAWING DEVELOPED FROM 1995/2000 FORT WAINWRIGHT MASTER DRAWING PROVIDED BY COE.

0 500 1000 2000

SCALE IN FEET

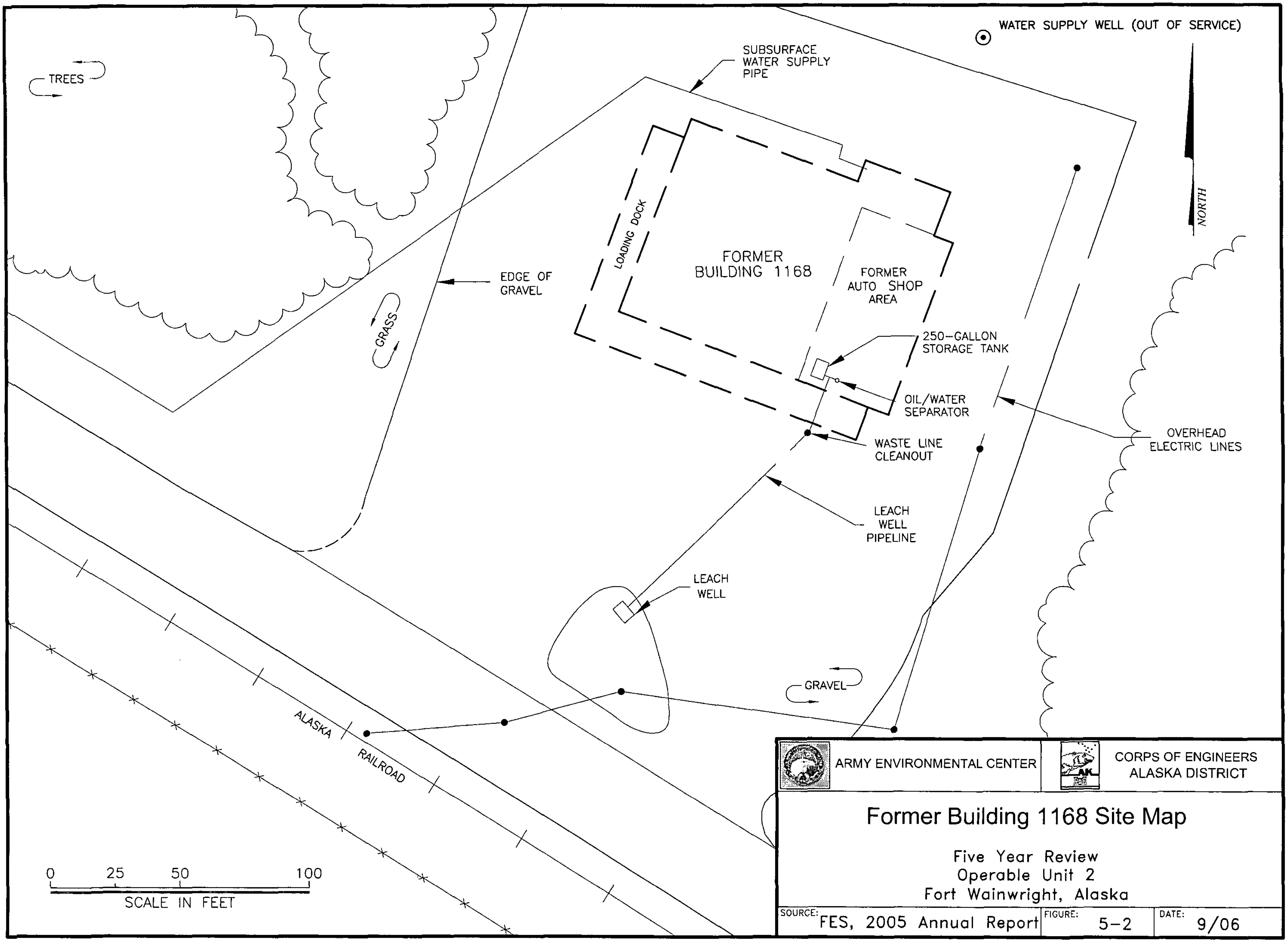
ARMY ENVIRONMENTAL CENTER	CORPS OF ENGINEERS ALASKA DISTRICT

OU2 Source Areas

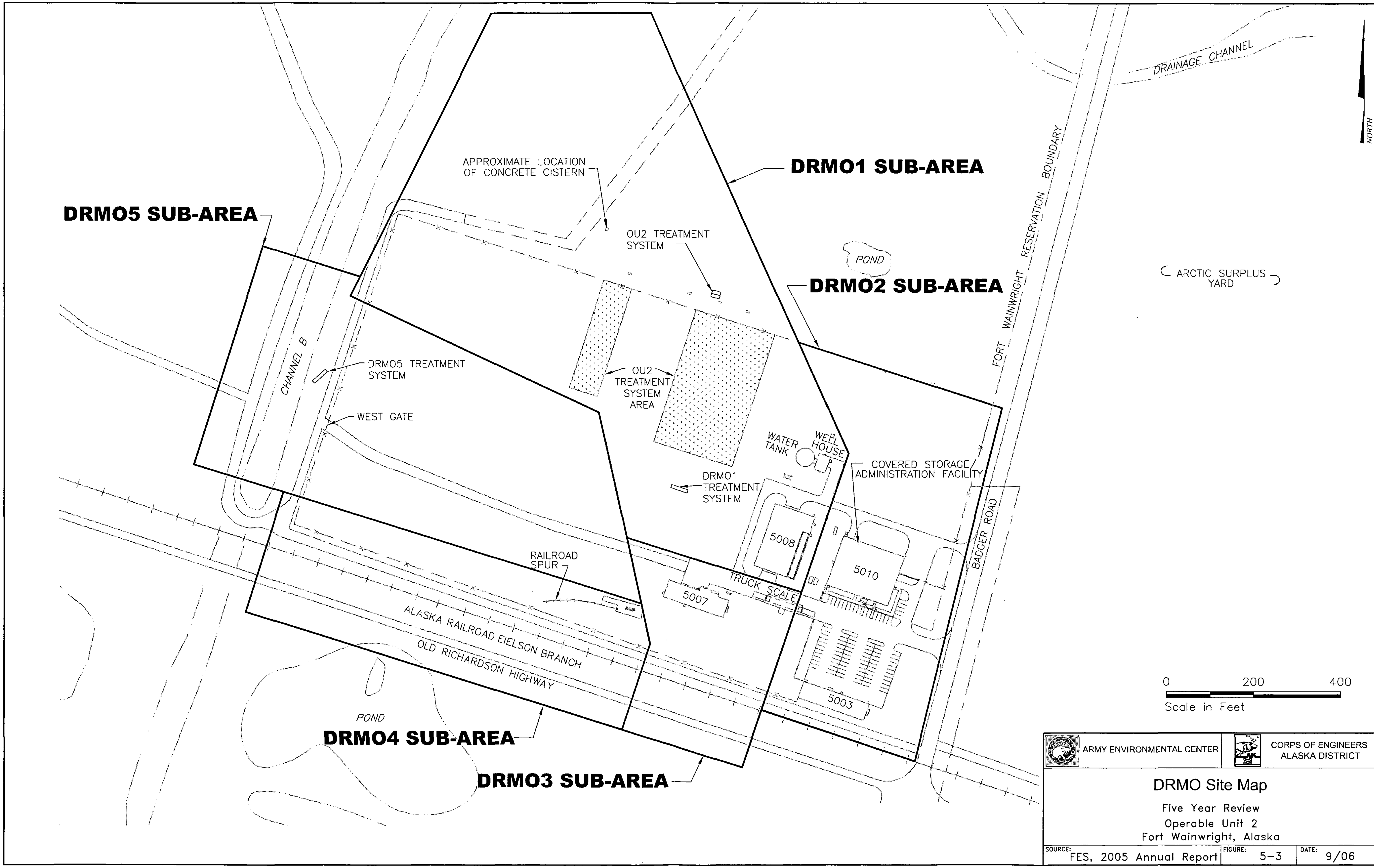
Five Year Review
Operable Unit 2
Fort Wainwright, Alaska

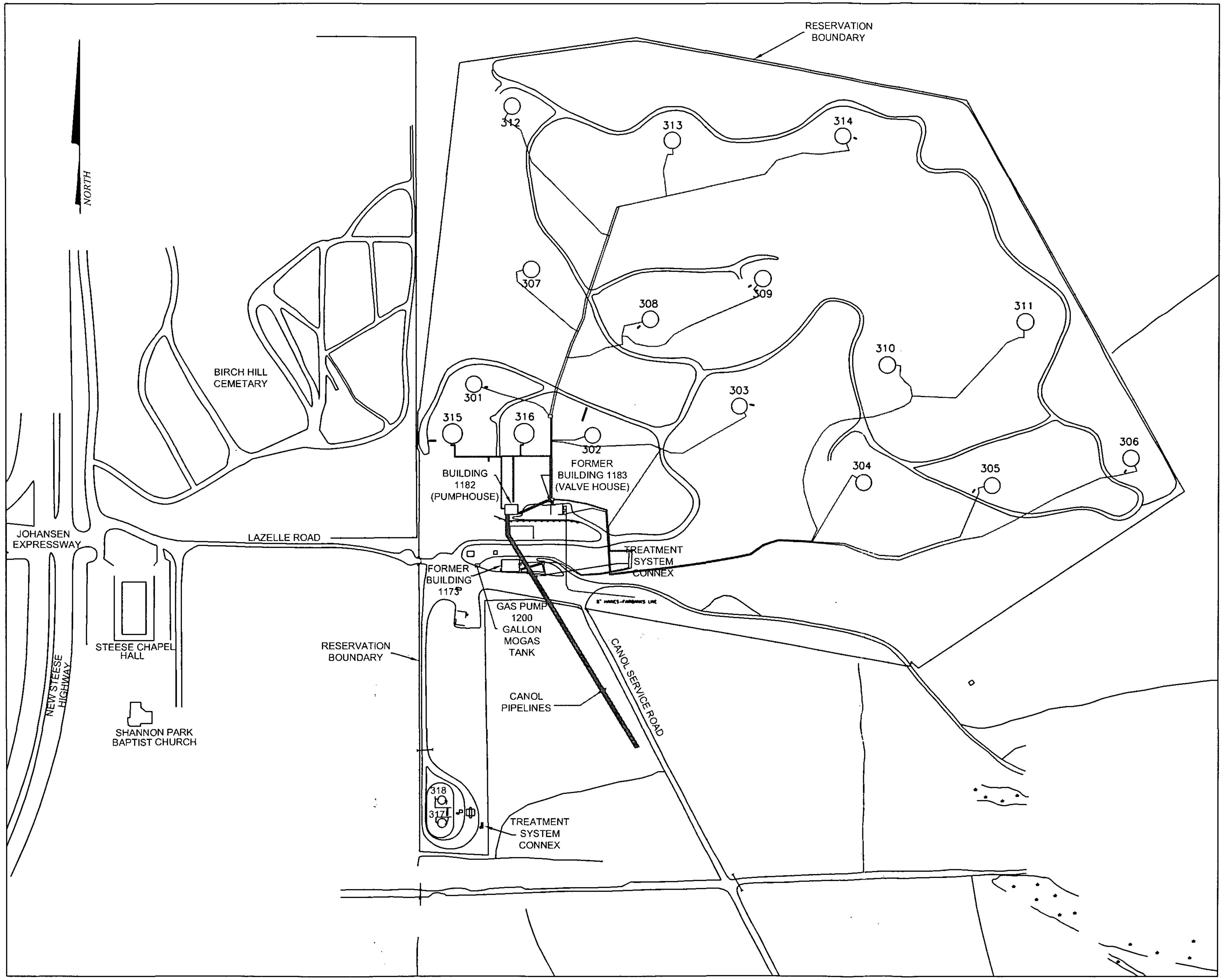
SOURCE: FES, 2005 Annual Report	FIGURE: 5-1	DATE: 9/06

741AF

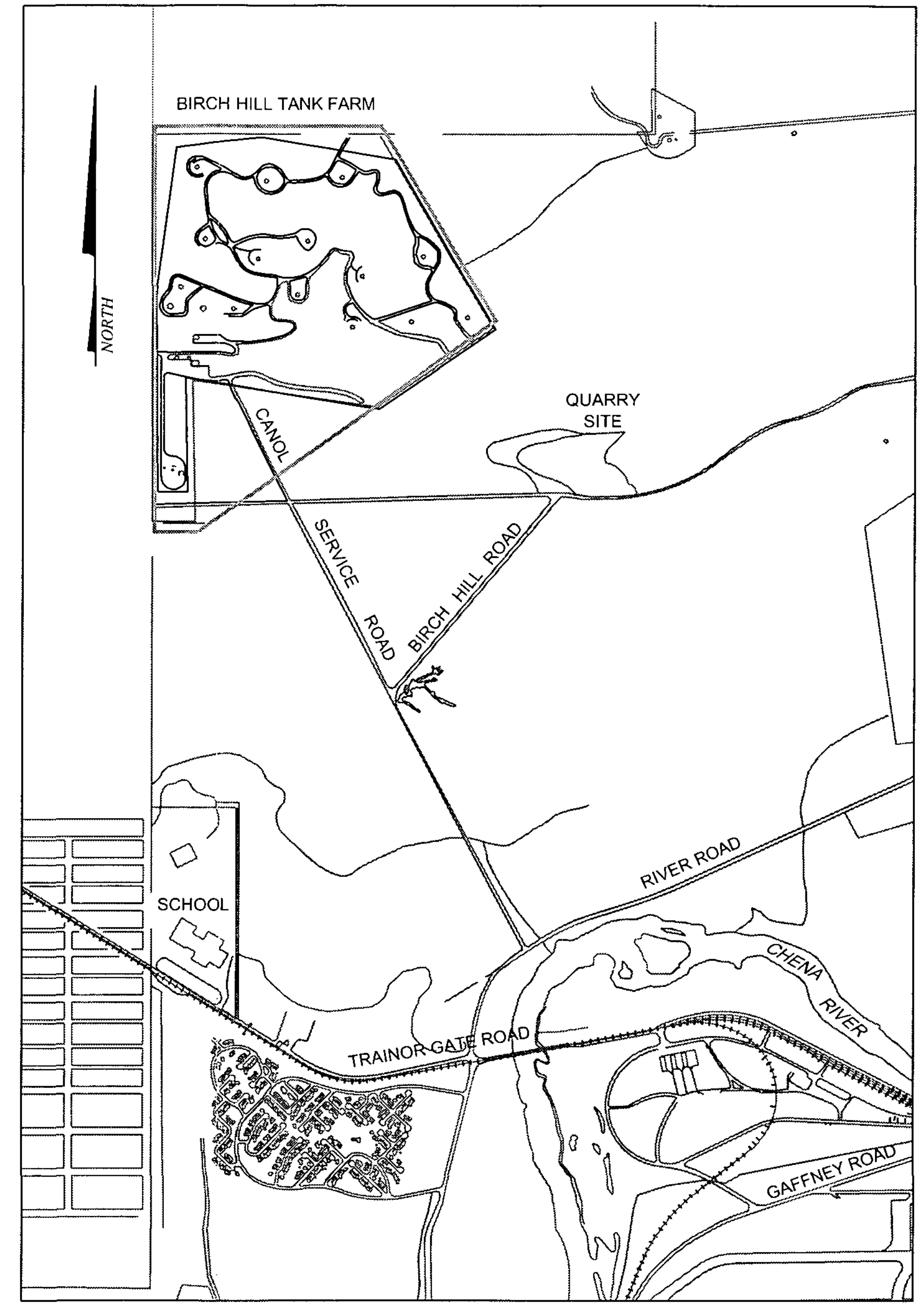

WATER SUPPLY WELL (OUT OF SERVICE)
SUBSURFACE WATER SUPPLY PIPE
TREES
NORTH
LOADING DOCK
FORMER BUILDING 1168
FORMER AUTO SHOP AREA
EDGE OF GRAVEL
GRASS
250-GALLON STORAGE TANK
OIL/WATER SEPARATOR
OVERHEAD ELECTRIC LINES
WASTE LINE CLEANOUT
LEACH WELL PIPELINE
LEACH WELL
GRAVEL
ALASKA RAILROAD
0 25 50 100
SCALE IN FEET
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Former Building 1168 Site Map
Five Year Review
Operable Unit 2
Fort Wainwright, Alaska
SOURCE: FES, 2005 Annual Report
FIGURE: 5-2
DATE: 9/06

729AF


DRAINAGE CHANNEL
NORTH
DRMO1 SUB-AREA
DRMO2 SUB-AREA
DRMO3 SUB-AREA
DRMO4 SUB-AREA
DRMO5 SUB-AREA
APPROXIMATE LOCATION OF CONCRETE CISTERN
OU2 TREATMENT SYSTEM
POND
ARCTIC SURPLUS YARD
FORT WAINWRIGHT RESERVATION BOUNDARY
CHANNEL B
DRMO5 TREATMENT SYSTEM
WEST GATE
OU2 TREATMENT SYSTEM AREA
WATER TANK
WELL HOUSE
COVERED STORAGE ADMINISTRATION FACILITY
DRMO1 TREATMENT SYSTEM
5008
5010
5007
5003
TRUCK SCALE
BADGER ROAD
RAILROAD SPUR
RAMP
ALASKA RAILROAD EIELSON BRANCH
OLD RICHARDSON HIGHWAY
POND
0
200
400
Scale in Feet
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
DRMO Site Map
Five Year Review
Operable Unit 2
Fort Wainwright, Alaska
SOURCE: FES, 2005 Annual Report
FIGURE: 5-3
DATE: 9/06
730AF



0 200 400 800
SCALE IN FEET



0 750 1500 3000
SCALE IN FEET

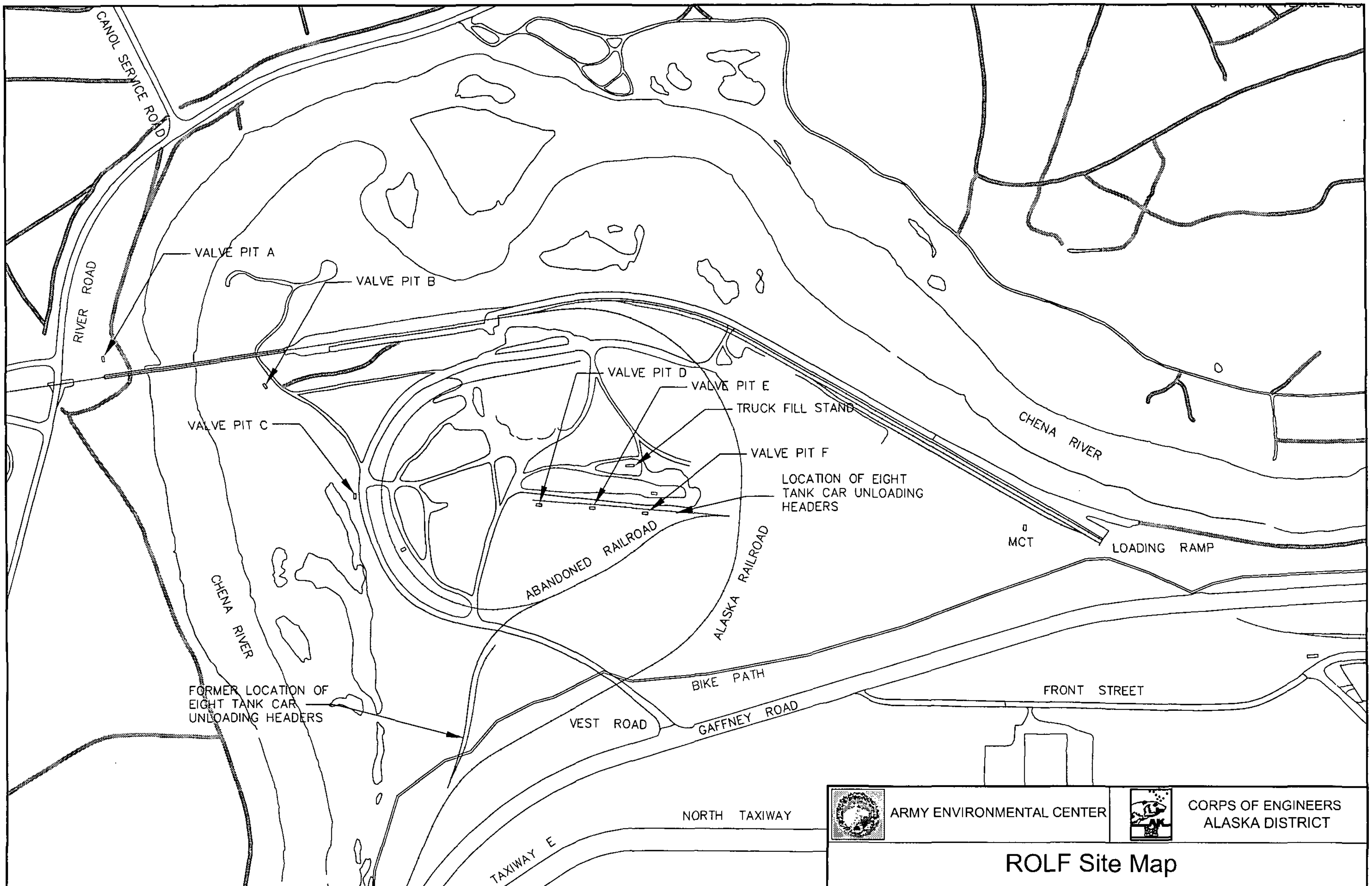
ARMY ENVIRONMENTAL CENTER	CORPS OF ENGINEERS ALASKA DISTRICT

Birch Hill Tank Farm Site Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE: FES, 2006 5 Year	FIGURE: 6-1	DATE: 9/06

761AF



Horizontal datum is Alaska State Plane, Zone 3, NAD83 in meters.
Vertical datum is NAVD88 in meters.
This map conforms to National Map Accuracy Standards as related to the project photo control for scales of 1:1000 or smaller.
Contours in vegetated areas may be less accurate.
Photography Date: 5-16-1997

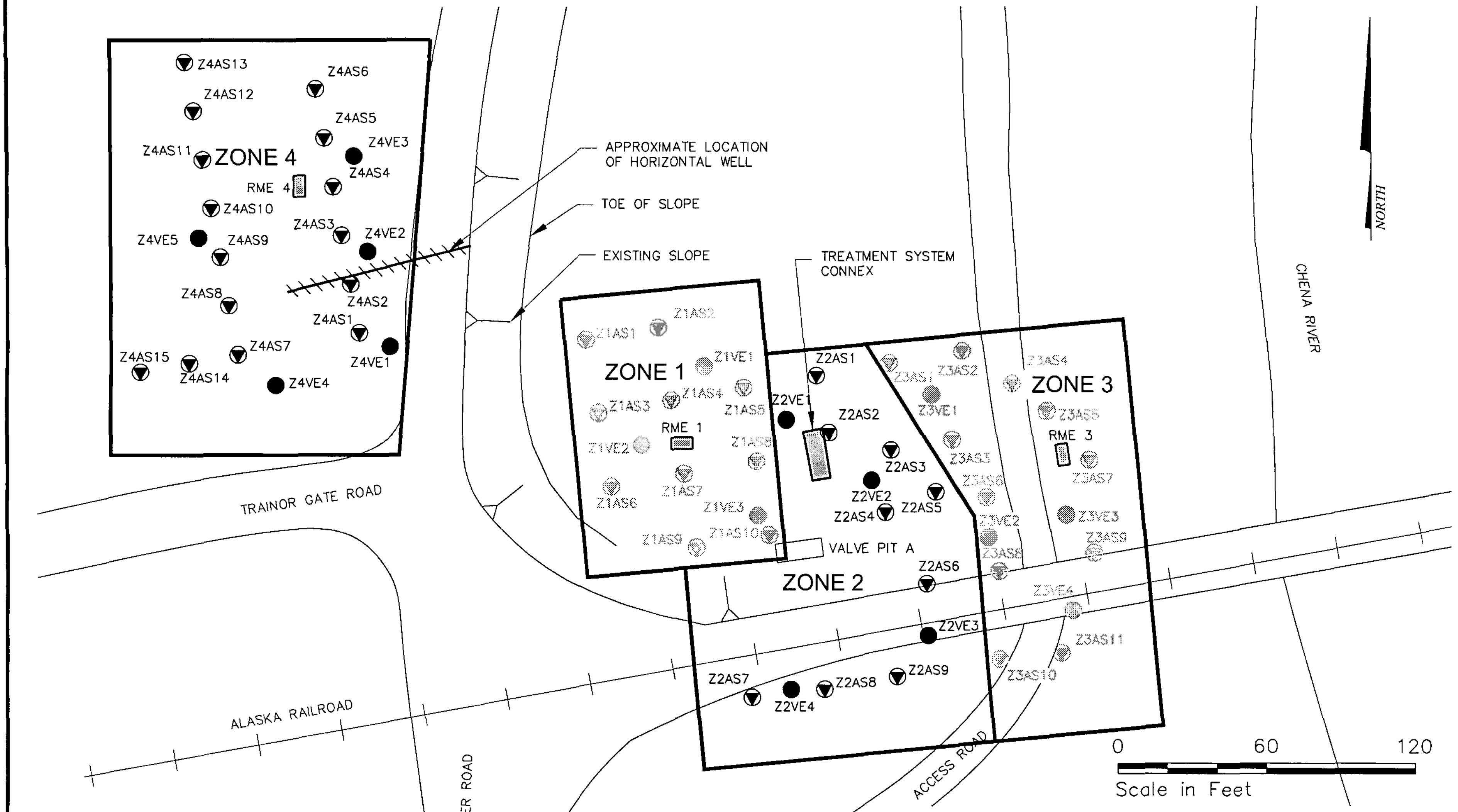
ARMY ENVIRONMENTAL CENTER | CORPS OF ENGINEERS ALASKA DISTRICT

ROLF Site Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE: DPW, 2004 Base Map | FIGURE: 6-2 | DATE: 9/06

731AF



LEGEND:

Z2AS9	AIR SPARGE PROBE LOCATION
Z2VE1	VAPOR EXTRACTION PROBE LOCATION
Z1AS9	AIR SPARGE PROBE LOCATION NOT IN OPERATION
Z1VE1	VAPOR EXTRACTION PROBE LOCATION NOT IN OPERATION
RME 1	REMOTE MONITORING ENCLOSURE

NOTES:

1. ZONES 1 AND 2 WERE SHUTDOWN IN 2/04 TO CONDUCT A REBOUND STUDY
2. VAPOR EXTRACTION SYSTEM OPERATED FROM 4/05 TO 10/05
3. ZONE 4 WAS SHUTDOWN IN 11/05 TO CONDUCT A REBOUND STUDY

ARMY ENVIRONMENTAL CENTER

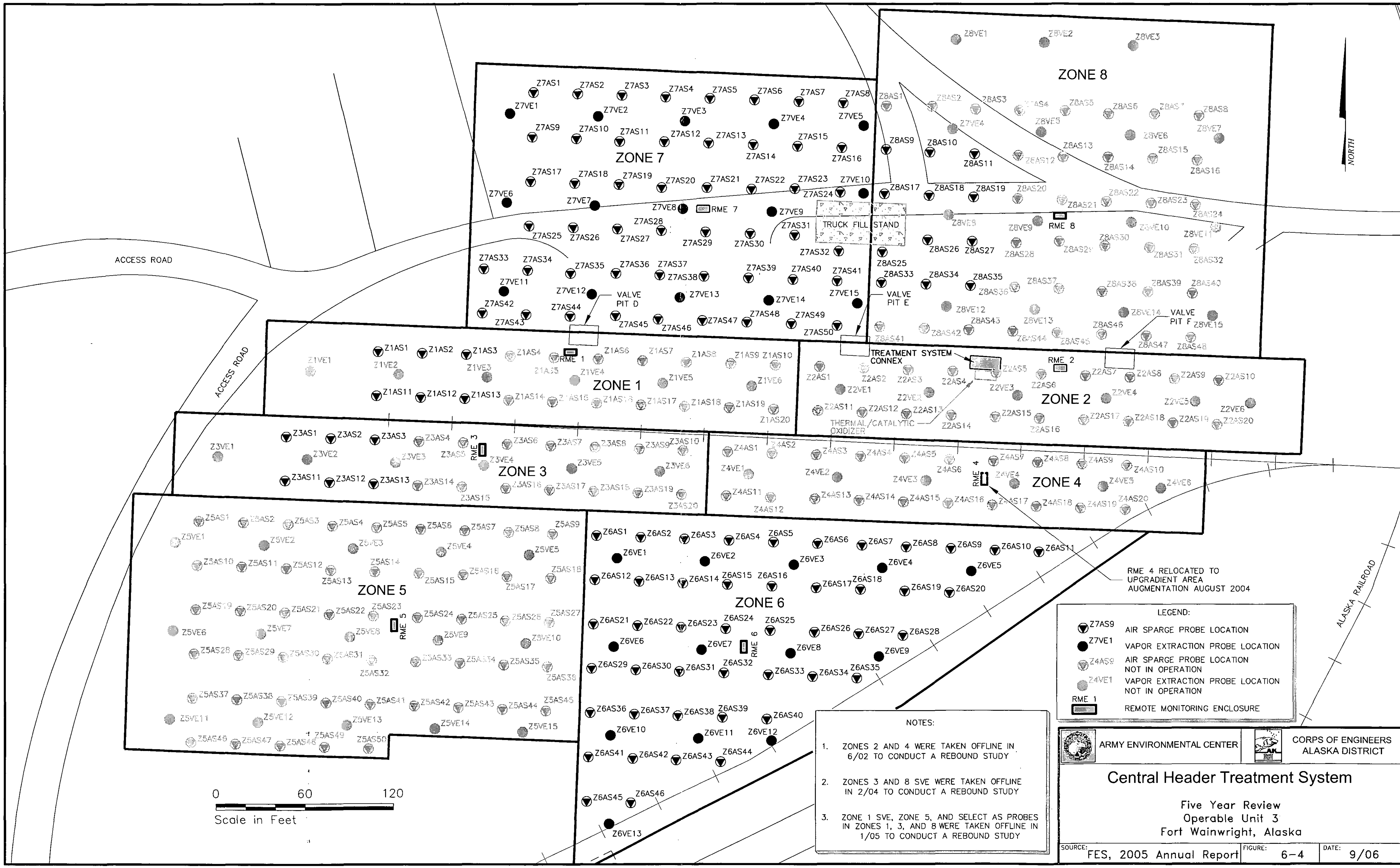
CORPS OF ENGINEERS
ALASKA DISTRICT

Valve Pit A Treatment System

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

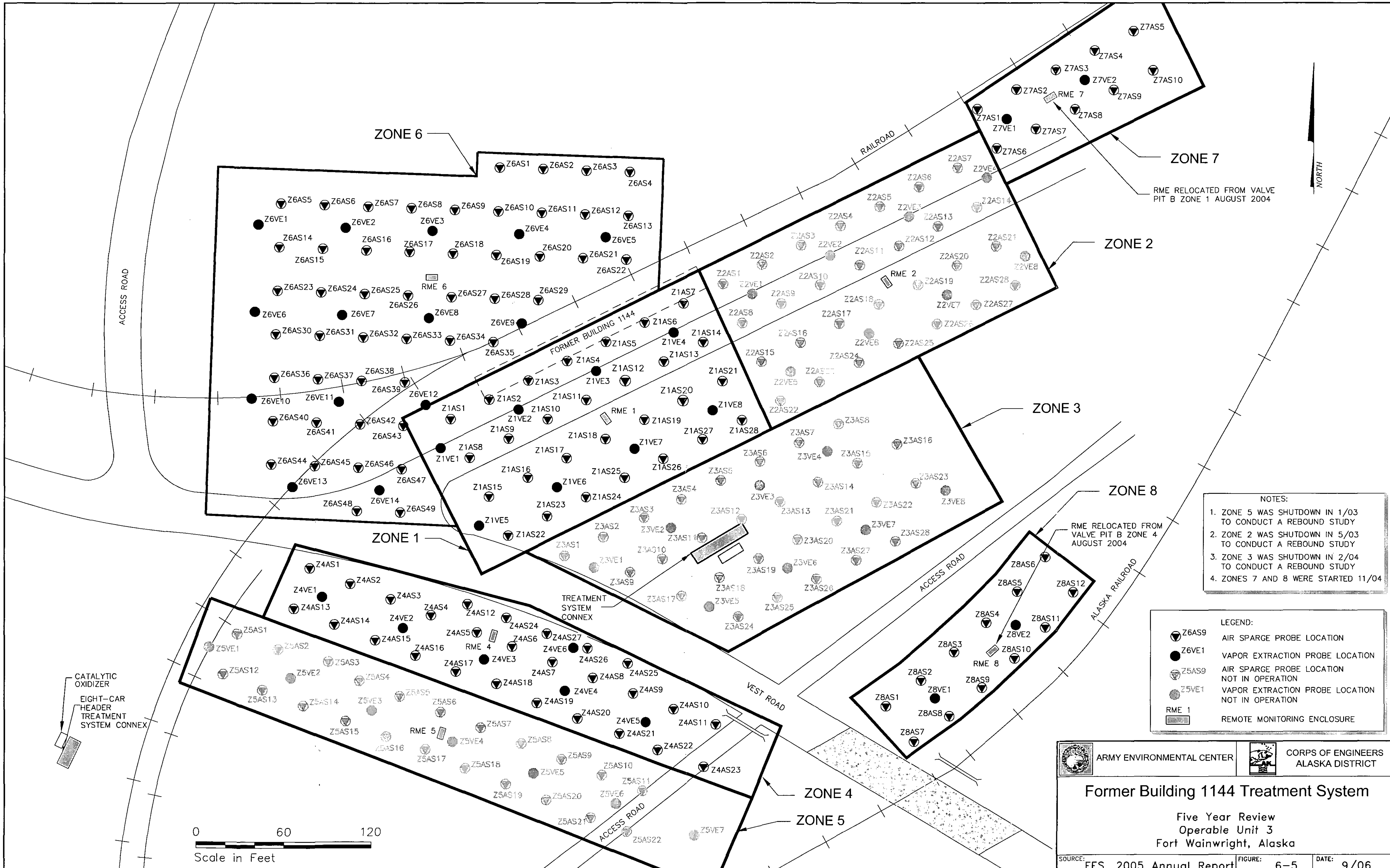
SOURCE:	FIGURE:	DATE:
FES, 2005 Annual Report	6-3	9/06

732AF



ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 6
ZONE 7
ZONE 8
ACCESS ROAD
ACCESS ROAD
ALASKA RAILROAD
NORTH
TRUCK FILL STAND
VALVE PIT D
VALVE PIT E
VALVE PIT F
TREATMENT SYSTEM CONNEX
THERMAL/CATALYTIC OXIDIZER
RME 4 RELOCATED TO UPGRADIENT AREA AUGMENTATION AUGUST 2004
0 60 120
Scale in Feet
LEGEND:
Z7AS9 AIR SPARGE PROBE LOCATION
Z7VE1 VAPOR EXTRACTION PROBE LOCATION
Z4AS9 AIR SPARGE PROBE LOCATION NOT IN OPERATION
Z4VE1 VAPOR EXTRACTION PROBE LOCATION NOT IN OPERATION
RME 1 REMOTE MONITORING ENCLOSURE
NOTES:
1. ZONES 2 AND 4 WERE TAKEN OFFLINE IN 6/02 TO CONDUCT A REBOUND STUDY
2. ZONES 3 AND 8 SVE WERE TAKEN OFFLINE IN 2/04 TO CONDUCT A REBOUND STUDY
3. ZONE 1 SVE, ZONE 5, AND SELECT AS PROBES IN ZONES 1, 3, AND 8 WERE TAKEN OFFLINE IN 1/05 TO CONDUCT A REBOUND STUDY
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Central Header Treatment System
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska
SOURCE: FES, 2005 Annual Report
FIGURE: 6-4
DATE: 9/06

734AF



ARMY ENVIRONMENTAL CENTER

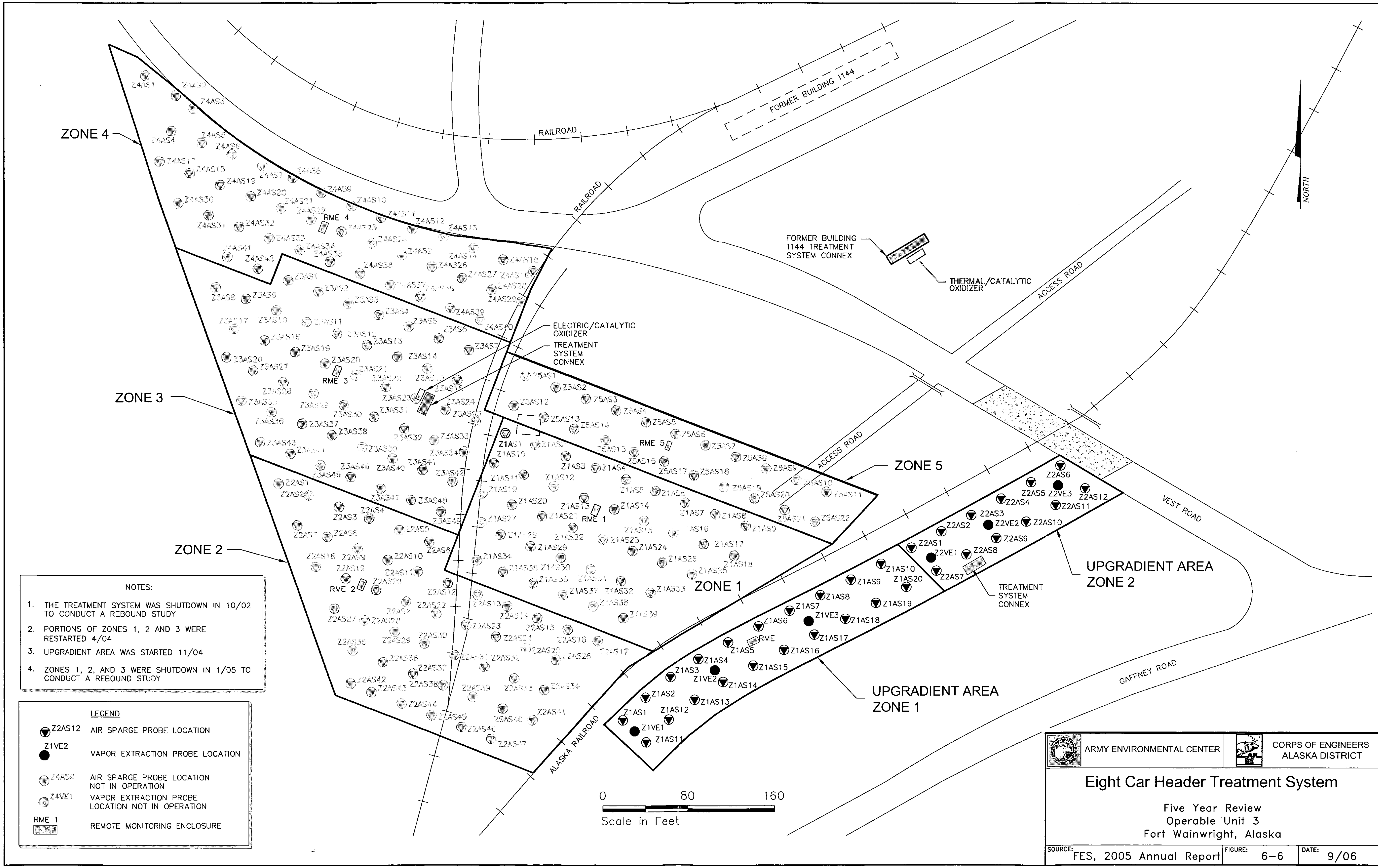
CORPS OF ENGINEERS ALASKA DISTRICT

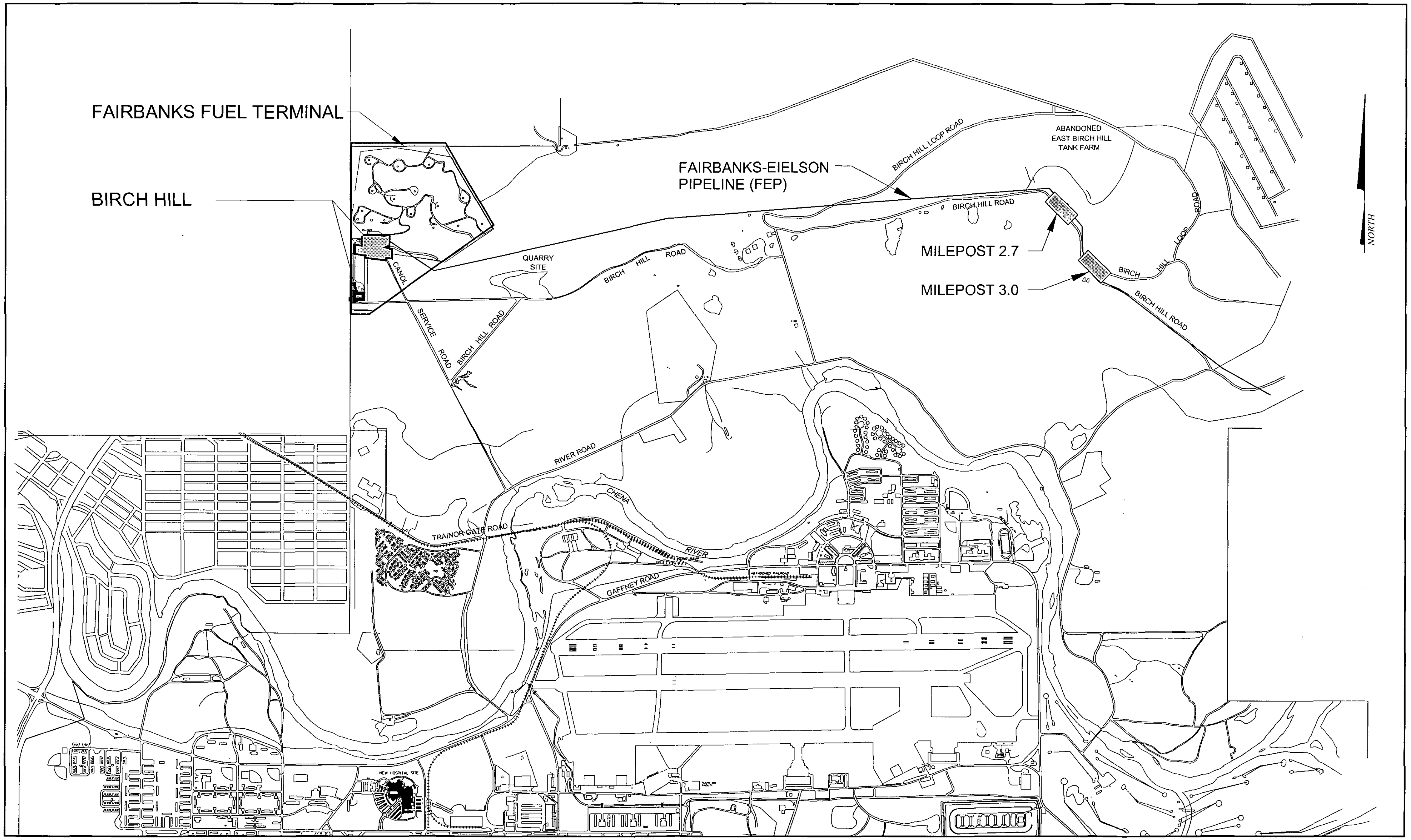
Former Building 1144 Treatment System

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE: FES, 2005 Annual Report	FIGURE: 6-5	DATE: 9/06

735AF


ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
UPGRADIENT AREA ZONE 1
UPGRADIENT AREA ZONE 2
RAILROAD
ALASKA RAILROAD
FORMER BUILDING 1144
FORMER BUILDING 1144 TREATMENT SYSTEM CONNEX
THERMAL/CATALYTIC OXIDIZER
ELECTRIC/CATALYTIC OXIDIZER
TREATMENT SYSTEM CONNEX
ACCESS ROAD
VEST ROAD
GAFFNEY ROAD
NORTH
RME 1
RME 2
RME 3
RME 4
RME 5
0 80 160
Scale in Feet
NOTES:
1. THE TREATMENT SYSTEM WAS SHUTDOWN IN 10/02 TO CONDUCT A REBOUND STUDY
2. PORTIONS OF ZONES 1, 2 AND 3 WERE RESTARTED 4/04
3. UPGRADIENT AREA WAS STARTED 11/04
4. ZONES 1, 2, AND 3 WERE SHUTDOWN IN 1/05 TO CONDUCT A REBOUND STUDY
LEGEND
Z2AS12 AIR SPARGE PROBE LOCATION
Z1VE2 VAPOR EXTRACTION PROBE LOCATION
Z4AS9 AIR SPARGE PROBE LOCATION NOT IN OPERATION
Z4VE1 VAPOR EXTRACTION PROBE LOCATION NOT IN OPERATION
RME 1 REMOTE MONITORING ENCLOSURE
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Eight Car Header Treatment System
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska
SOURCE: FES, 2005 Annual Report
FIGURE: 6-6
DATE: 9/06
736AF



0 1000 2000 4000
SCALE IN FEET

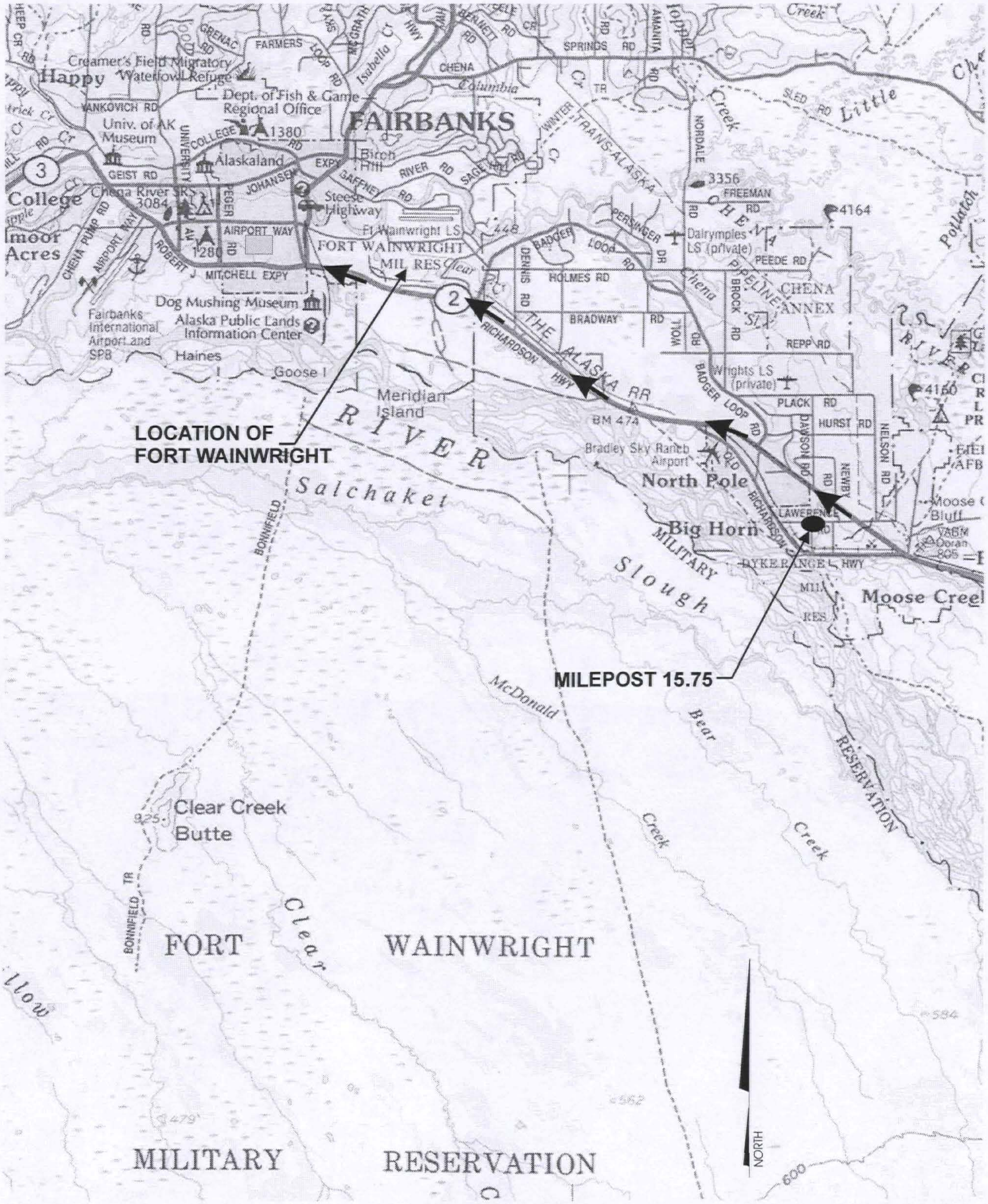
ARMY ENVIRONMENTAL CENTER	CORPS OF ENGINEERS ALASKA DISTRICT

Milepost 2.7 and 3.0 Site Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE: FES, 2002 MP Assessement	FIGURE: 6-7	DATE: 9/06

737AF



0 4000 8000

APPROXIMATE SCALE IN FEET

SOURCE: ALASKA ATLAS AND GAZETTER, 1992

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS
ALASKA DISTRICT

Milepost 15.75 Location Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2005 Work Plan	6–8	9/06

202C

0 500 1000

APPROXIMATE SCALE IN FEET

SOURCES: 1. ECOLOGY AND ENVIRONMENT, 1996
2. R&M CONSULTANTS, 1993 SURVVEY

LEGEND	
CVP-350	CONTROL VALVE PIT
#350	UNDERGROUND STORAGE TANK
TFS-2	TRUCK FILL STAND
TULR-3	TRUCK UNLOADING RACKS
VP	VALVE PIT
WSP	WATER SEPARATOR PIT
(orange line)	8-INCH FUEL LINE
(blue line)	6-INCH FUEL LINE
(green line)	4-INCH FUEL LINE

ARMY ENVIRONMENTAL CENTER

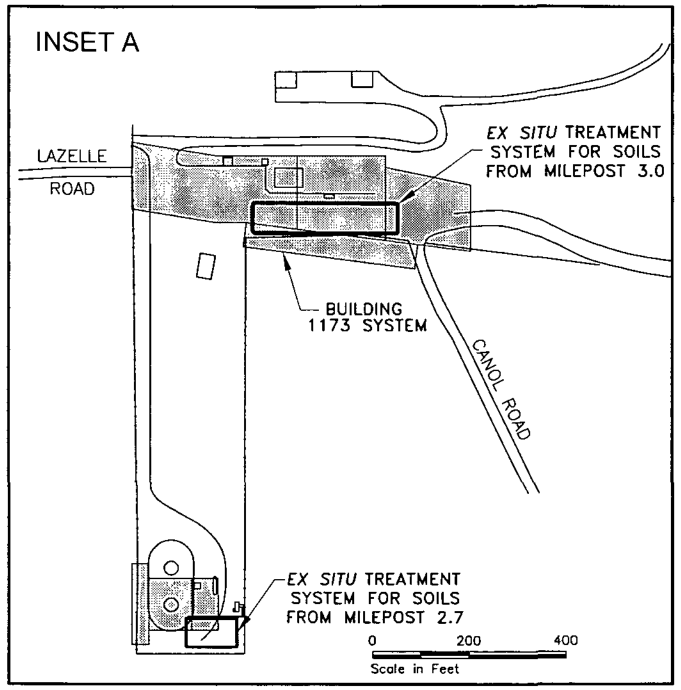
CORPS OF ENGINEERS
ALASKA DISTRICT

East Birch Hill Tank Farm and Associated Piping

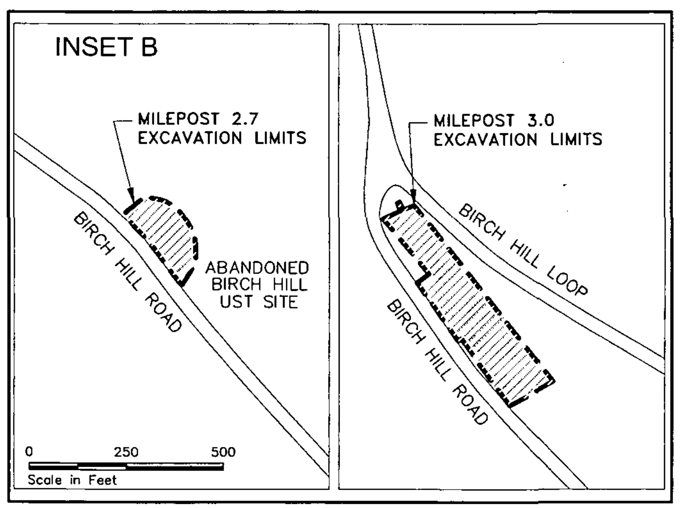
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2002 MP Assessment	6-9	9/06

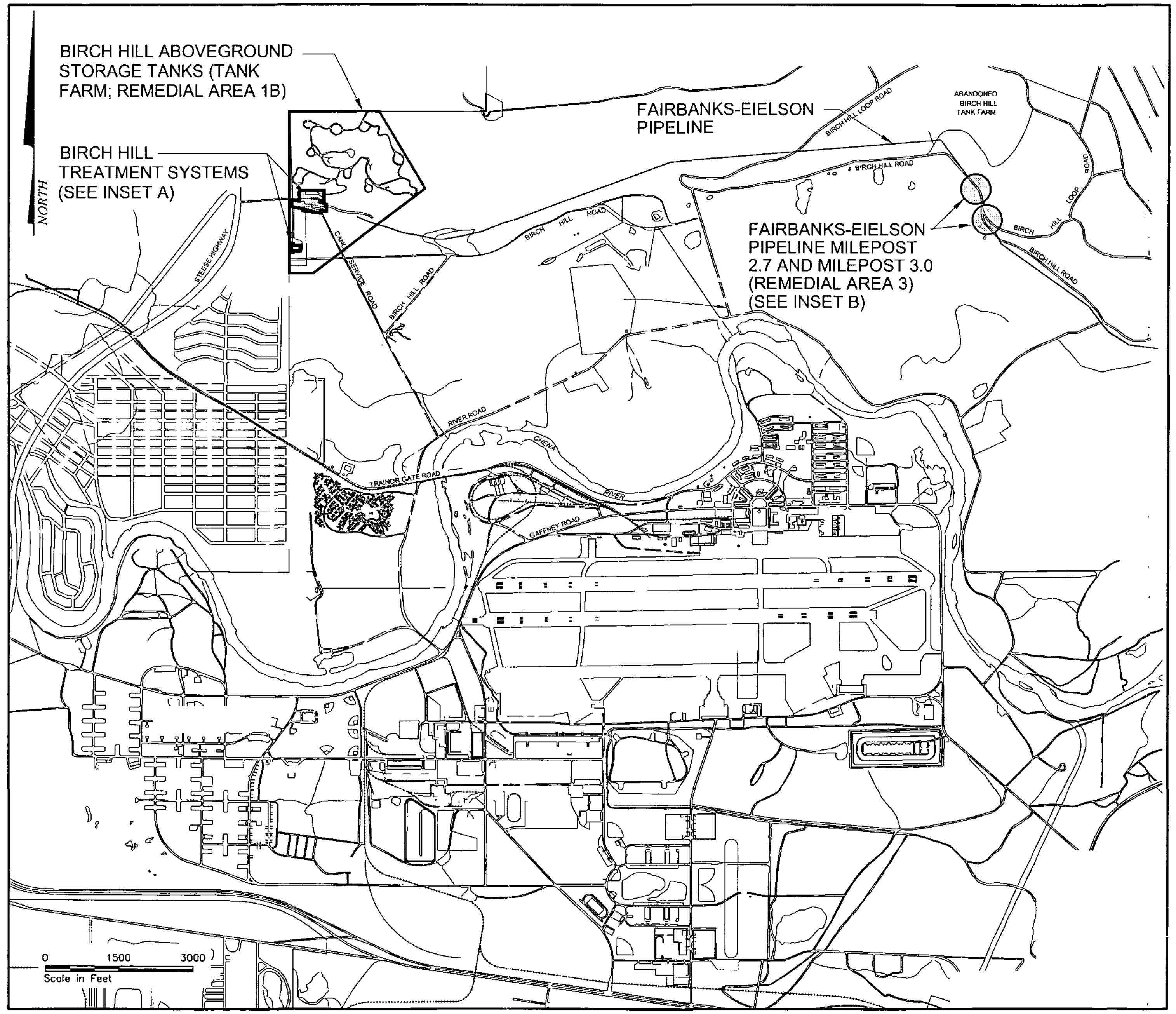
201C



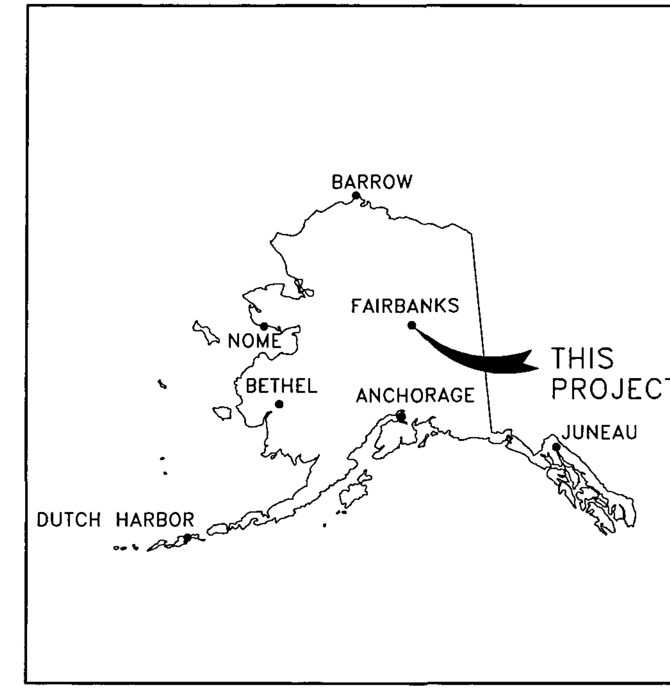
REMEDIAL AREA 1B BIRCH HILL TANK FARM TREATMENT SYSTEMS



REMEDIAL AREA 3 FAIRBANKS-EIELSON PIPELINE MILEPOST 2.7 AND 3.0



SITE VICINITY MAP



PROJECT LOCATION MAP

ARMY ENVIRONMENTAL CENTER

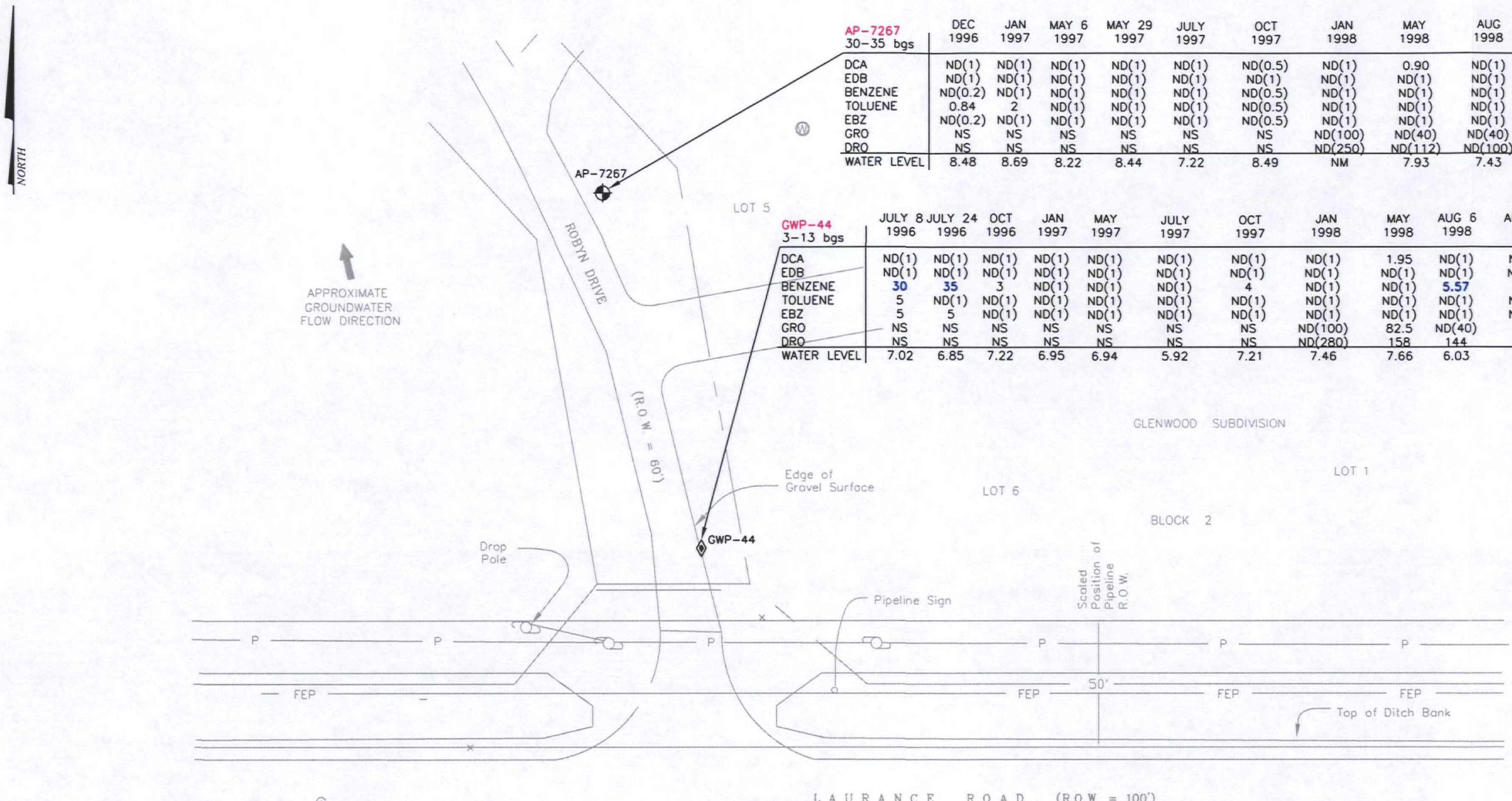
CORPS OF ENGINEERS
ALASKA DISTRICT

Milepost 2.7 and 3.0 Excavation Area and Treatment Cell Locations

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2005 Decommissioning	6-10	9/06

738AF



AP-7267 30-35 bgs	DEC 1996	JAN 1997	MAY 6 1997	MAY 29 1997	JULY 1997	OCT 1997	JAN 1998	MAY 1998	AUG 1998	AUG 1999	OCT 2000	SEPT 2001	SEPT 2002	AUG 2005
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(1)	0.90	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)
EDB	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.0002)	ND(1)	ND(0.0310)	ND(1)	ND(1)
BENZENE	ND(0.2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.4)
TOLUENE	0.84	2	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EBZ	ND(0.2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
GRO	NS	NS	NS	NS	NS	NS	ND(100)	ND(40)	ND(40)	ND (90)	ND(90)	ND(90)	132	ND(90)
DRO	NS	NS	NS	NS	NS	NS	ND(250)	ND(112)	ND(100)	ND(313)	ND(313)	ND(505)	ND(495)	68.6
WATER LEVEL	8.48	8.69	8.22	8.44	7.22	8.49	NM	7.93	7.43	7.45	7.68	7.31	7.61	8.03

GWP-44 3-13 bgs	JULY 8 1996	JULY 24 1996	OCT 1996	JAN 1997	MAY 1997	JULY 1997	OCT 1997	JAN 1998	MAY 1998	AUG 6 1998	AUG 25 1998	AUG 1999	OCT 2000	SEPT 2001	SEPT 2002	AUG 2005
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.95	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)
EDB	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.002)	ND(1)	ND(0.0314)	ND(1)	ND(1)
BENZENE	**30**	**35**	3	ND(1)	ND(1)	ND(1)	4	ND(1)	ND(1)	**5.57**	4.43	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.4)
TOLUENE	5	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EBZ	5	5	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
GRO	NS	NS	NS	NS	NS	NS	NS	ND(100)	82.5	ND(40)	NA	ND (90)	ND(90)	ND(90)	ND(90)	ND(90)
DRO	NS	NS	NS	NS	NS	NS	NS	ND(280)	158	144	NA	ND(313)	ND(309)	ND(505)	ND(500)	109
WATER LEVEL	7.02	6.85	7.22	6.95	6.94	5.92	7.21	7.46	7.66	6.03	6.09	5.86	6.08	6.51	5.60	5.72

AP-7915 3-13	OCT 2000	SEPT 2001	SEPT 2002	AUG 2005
DCA	ND(1)	ND(1)	ND(1)	ND(0.5)
EDB	ND(1)	ND(0.0310)	ND(1)	ND(1)
BENZENE	**37.5**	**6.26**	ND(0.5)	ND(0.4)
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)
EBZ	7.55	ND(1)	ND(1)	ND(1)
GRO	134	ND(90)	ND(90)	ND(90)
DRO	ND(316)	ND(500)	ND(500)	69.2
WATER LEVEL	3.44	4.00	3.20	3.47

GWP-42 3-13 bgs	JULY 8 1996	JULY 24 1996	OCT 1996	MAY 1997	JULY 1997	AUG 1997	OCT 1997	JAN 1998	MAY 1998	AUG 6 1998	AUG 25 1998	AUG 1999
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.49	ND(1)
EDB	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.002)
BENZENE	**300**	**150**	**59**	ND(1)	**6**	**23**	**9**	4	ND(1)	**10.1**	**11.8**	2.5
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EBZ	4	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
GRO	NS	NS	NS	NS	NS	NS	NS	ND(0.100)	ND(40)	ND(40)	NA	ND (90)
DRO	NS	NS	NS	NS	NS	NS	NS	ND(290)	ND(108)	106	NA	ND(300)
WATER LEVEL	3.87	3.71	4.75	4.41	3.52	3.04	4.73	4.7	7.05	3.63	3.73	NM

MONITORING WELL KEY:

MONITORING WELL → AP-7915

SCREENED INTERVAL DEPTH IN FEET bgs → 3-13

AP-7915 3-13	OCT 2000	SEPT 2001
DCA	ND(1)	ND(1)
EDB	ND(1)	ND(0.0310)
BENZENE	**37.5**	**6.26**
TOLUENE	ND(1)	ND(1)
EBZ	7.55	ND(1)
GRO	134	ND(0.0900)
DRO	ND(0.316)	ND(0.500)
WATER LEVEL	3.44	4.00

CONCENTRATIONS EXCEEDING REMEDIAL ACTION GOALS ARE SHOWN IN BOLD

SEE LEGEND FOR ABBREVIATIONS.

WATER LEVEL MEASURED FROM TOP OF CASING

CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

REMEDIAL ACTION GOALS IN µg/L	
5	DCA
0.05	EDB
5	BENZENE
1,000	TOLUENE
700	EBZ

ADEC STANDARDS IN µg/L	
1,300	GRO
1,500	DRO

LEGEND:

(W)	DRINKING WATER WELL
AP-7915	MONITORING WELL
GWP-44	GROUNDWATER MONITORING PROBE
—— FEP ——	FAIRBANKS-EIELSON PIPELINE
—— P ——	POWER LINE
———	PROPERTY LINE
bgs	BELOW GROUND SURFACE
DCA	1,2-DICHLOROETHANE
EDB	1,2-DIBROMOETHANE
EBZ	ETHYLBENZENE
GRO	GASOLINE RANGE ORGANICS
DRO	DIESEL RANGE ORGANICS
NA	ANALYSIS NOT PERFORMED
ND	NOT DETECTED (DETECTION LIMIT)
NM	NOT MEASURED
NS	NOT SAMPLED

ARMY ENVIRONMENTAL CENTER

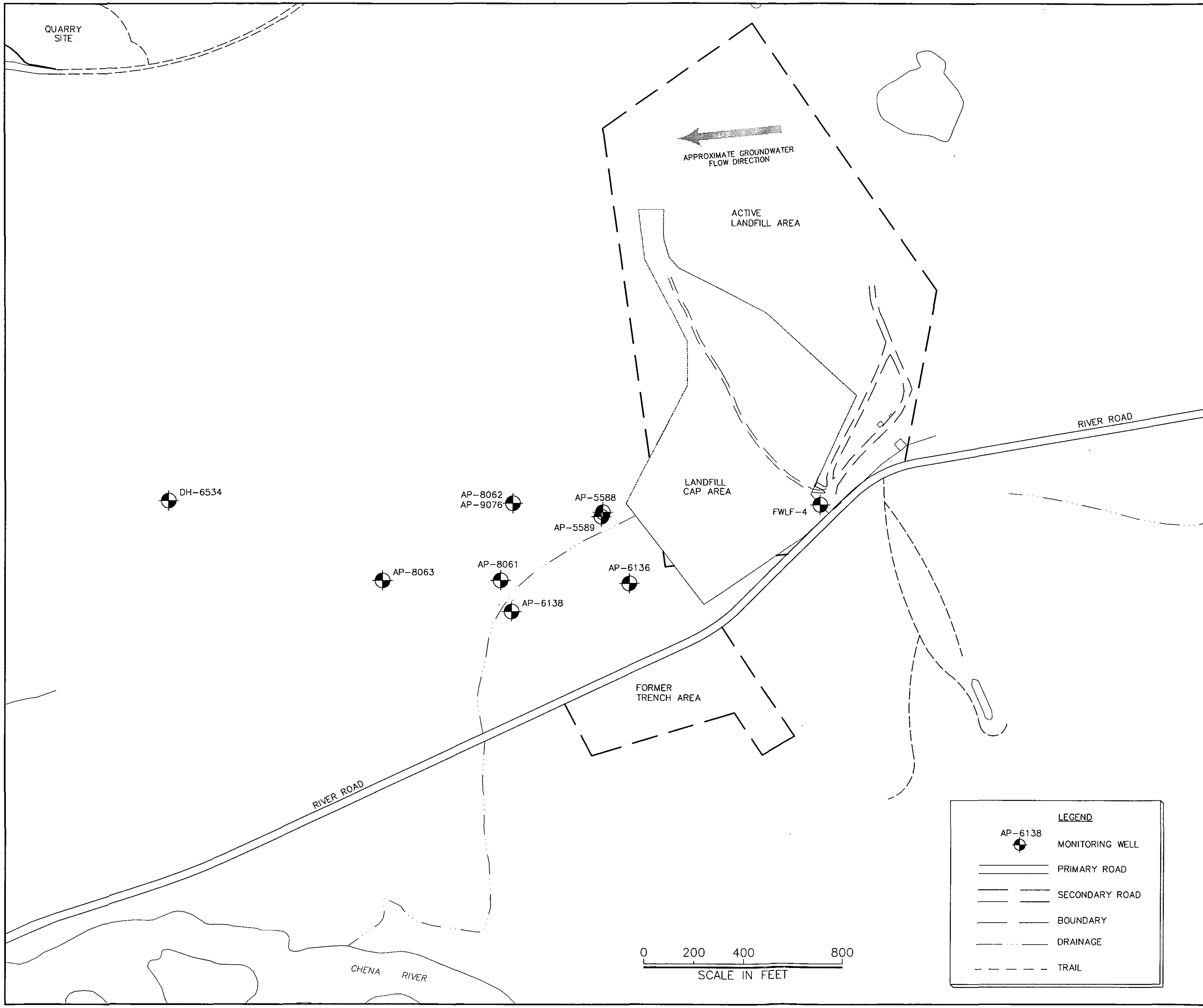
CORPS OF ENGINEERS ALASKA DISTRICT

Current Groundwater Results at Milepost 15.75

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE: FES, 2005 Annual Report | FIGURE: 6-11 | DATE: 9/06

739AF



ARMY ENVIRONMENTAL CENTER

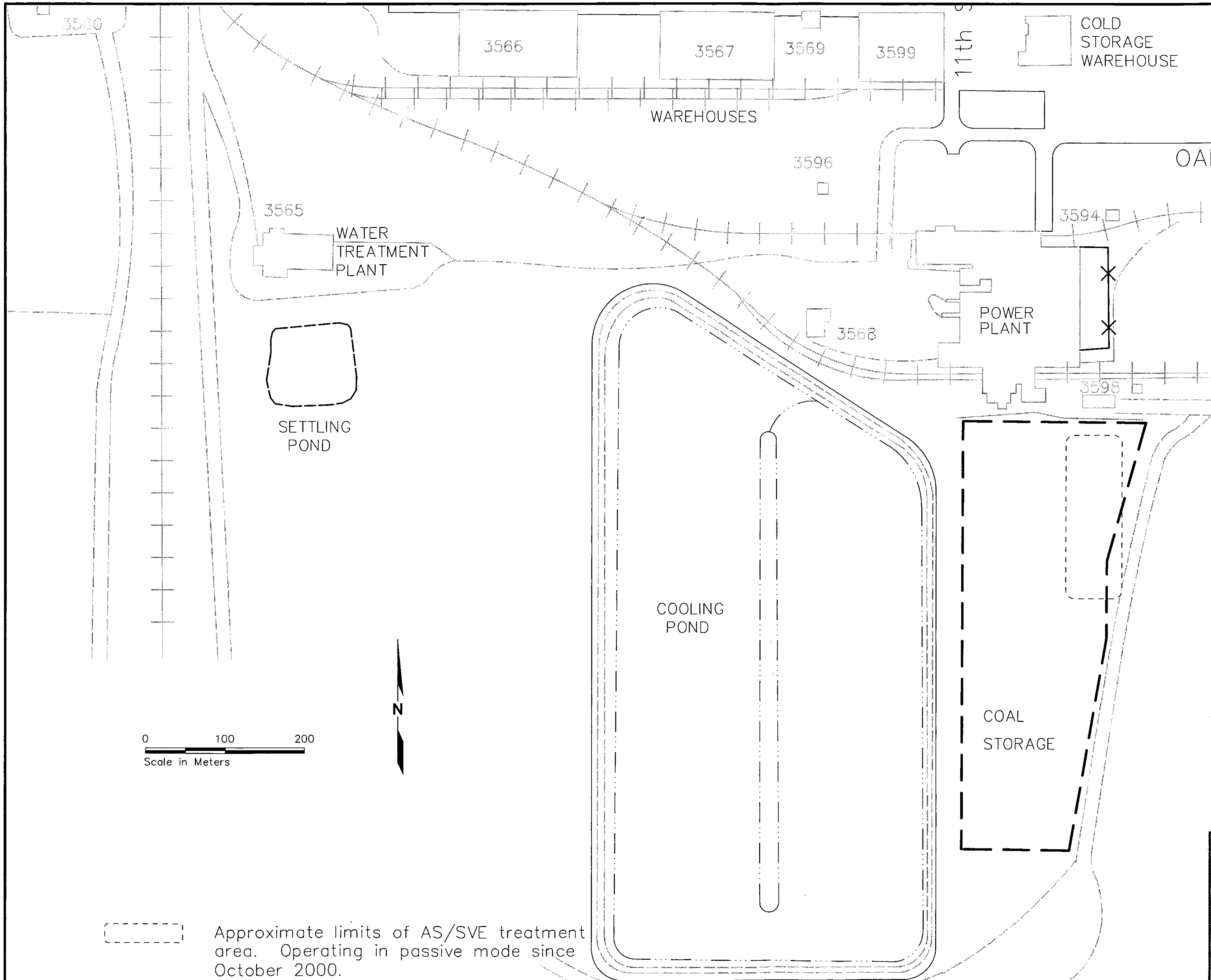
CORPS OF ENGINEERS
ALASKA DISTRICT

Landfill Site Map

Five Year Review
Operable Unit 4
Fort Wainwright, Alaska

SOURCE: FES, 2006 OU4 Work Plan	FIGURE: 7-1	DATE: 9/06

740AF



ARMY ENVIRONMENTAL CENTER

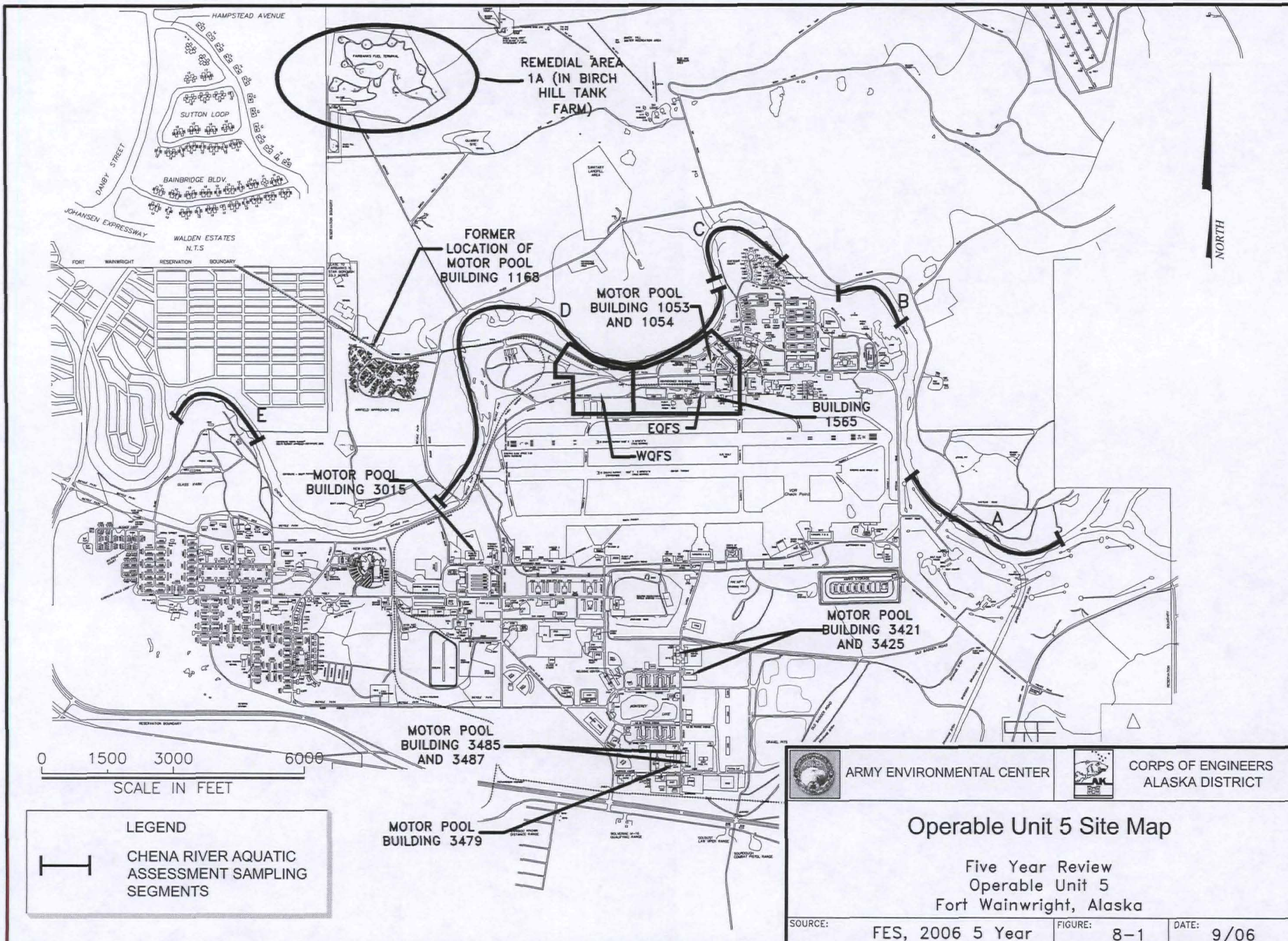
CORPS OF ENGINEERS
ALASKA DISTRICT

Coal Storage Yard Site Map

5 Year Review
Operable Unit 4
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
NW, 2003 Annual Report	7-2	9/06

743AF



ARMY ENVIRONMENTAL CENTER

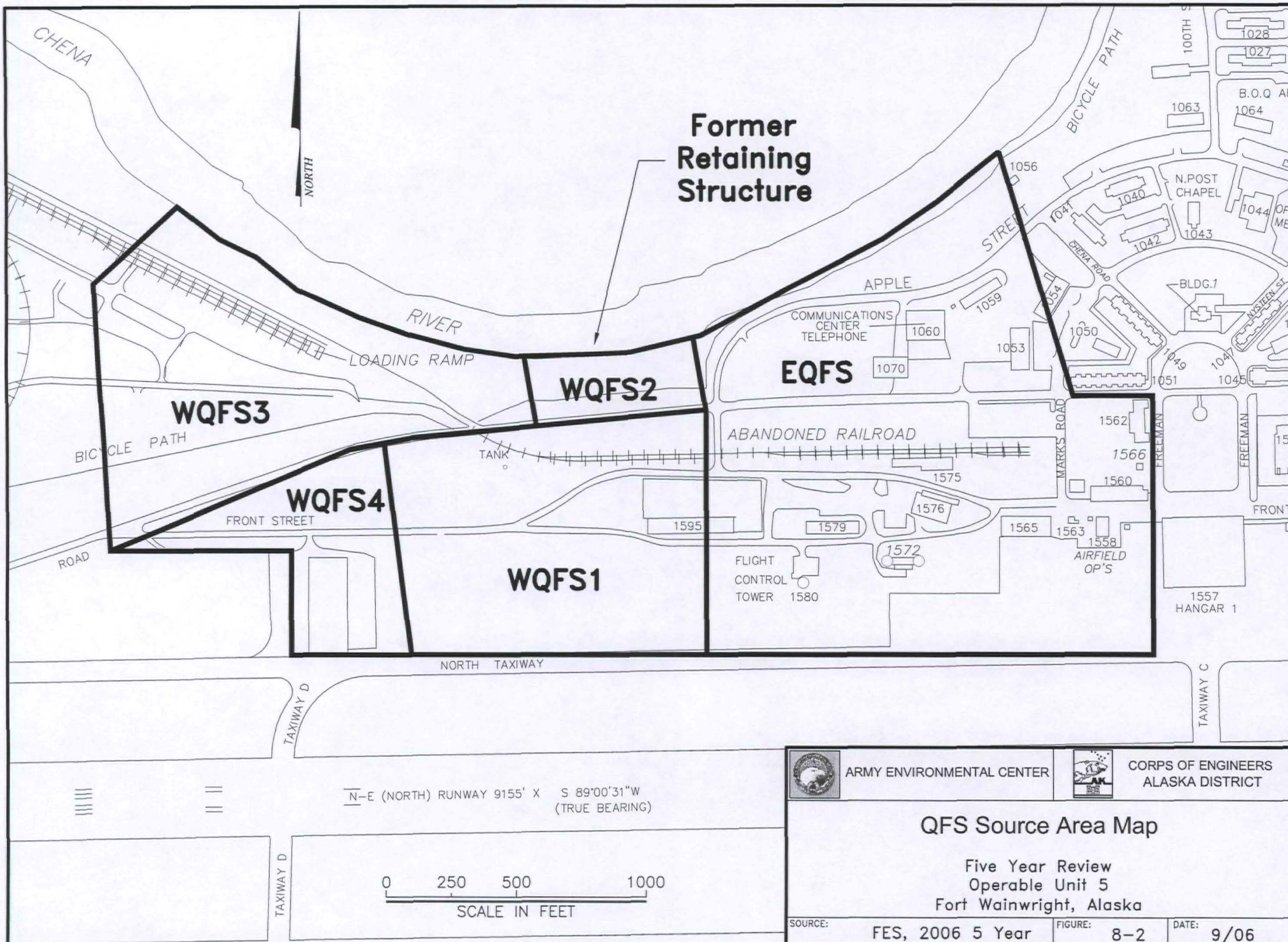
CORPS OF ENGINEERS
ALASKA DISTRICT

Operable Unit 5 Site Map

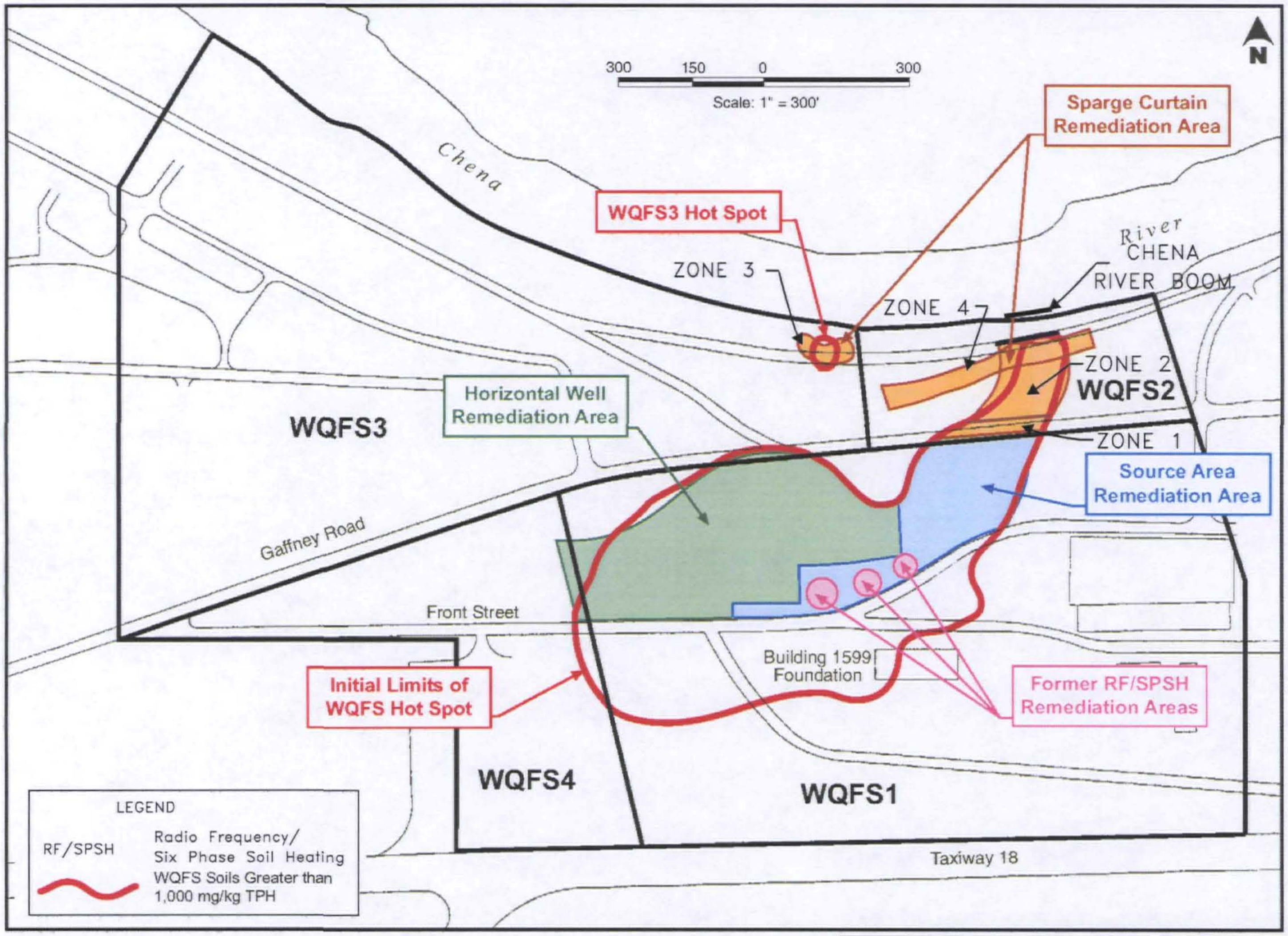
Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2006 5 Year	8-1	9/06

744AF


Former Retaining Structure
WQFS1
WQFS2
WQFS3
WQFS4
EQFS
NORTH
CHENA
RIVER
LOADING RAMP
BICYCLE PATH
ABANDONED RAILROAD
TANK
FRONT STREET
ROAD
APPLE STREET
COMMUNICATIONS CENTER TELEPHONE
FLIGHT CONTROL TOWER 1580
AIRFIELD OP'S
1557 HANGAR 1
N.POST CHAPEL
B.O.Q AR
BLDG.1
CHENA ROAD
NYSTEEN ST
MARKS ROAD
FREEMAN
100TH S
1028
1027
1063
1064
1056
1040
1041
1042
1043
1044
1059
1060
1070
1053
1054
1050
1049
1047
1051
1045
1562
1566
1560
1575
1576
1595
1579
1572
1565
1563
1558
NORTH TAXIWAY
TAXIWAY D
TAXIWAY C
N-E (NORTH) RUNWAY 9155' X S 89°00'31"W (TRUE BEARING)
0 250 500 1000
SCALE IN FEET
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
QFS Source Area Map
Five Year Review
Operable Unit 5
Fort Wainwright, Alaska
SOURCE: FES, 2006 5 Year
FIGURE: 8-2
DATE: 9/06

745AF



ARMY ENVIRONMENTAL CENTER

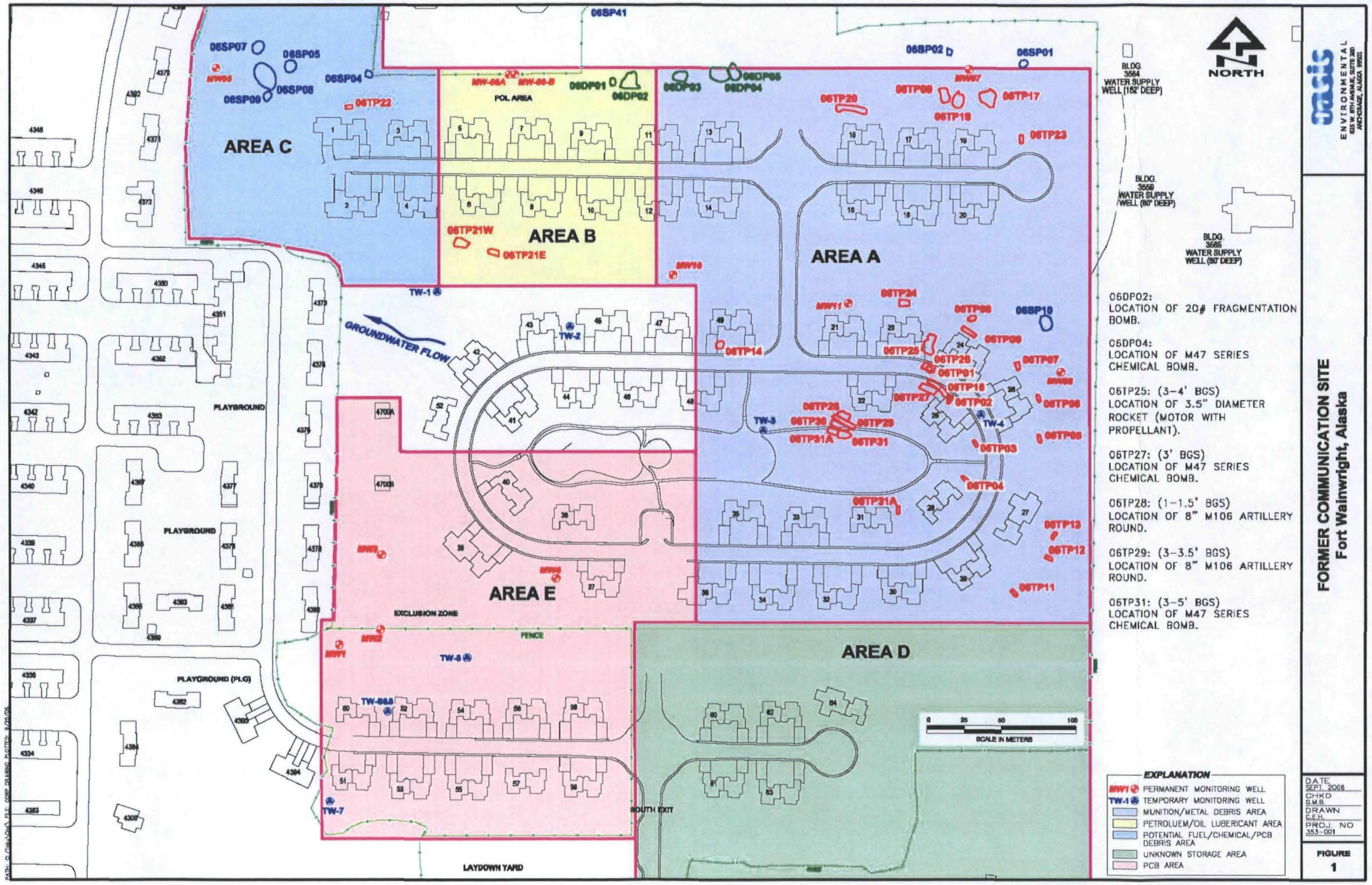
CORPS OF ENGINEERS ALASKA DISTRICT

OU5 Remediation Systems

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

SOURCE: CH2MHILL, 2003 CLOSES	FIGURE: 8-3	DATE: 9/06

203C



ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS
ALASKA DISTRICT

Areas of Concern at the Former Communications Site (Taku Gardens)

Five Year Review
New Source Area
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
Oasis, September 2006	8-4	9/06

790AF

Plates

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WA 98101

TARGET SHEET

The following document was not imaged.
This is due to the Original being:

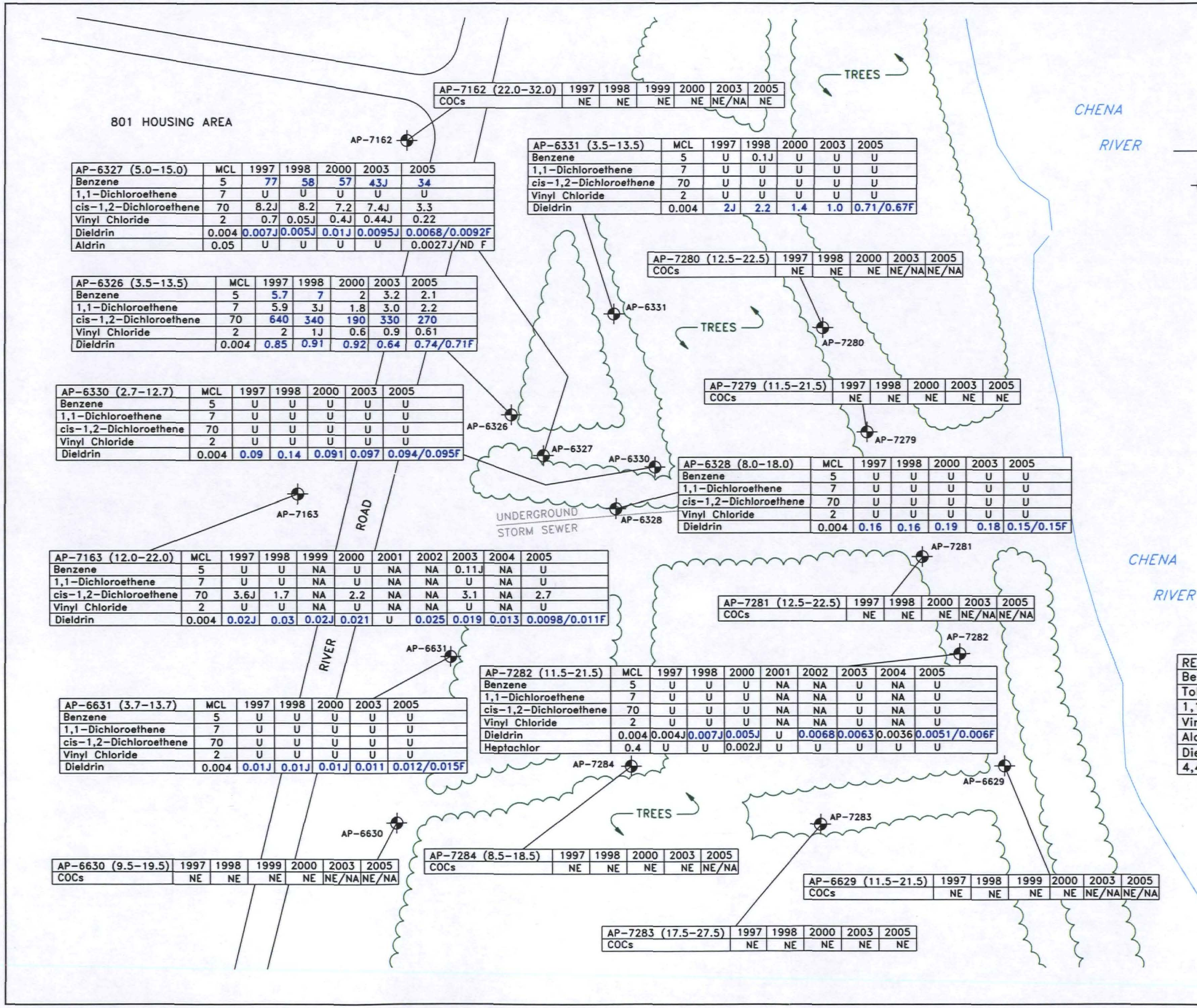
X Oversized
___ CD Rom
___ Computer Disk
___ Video Tape
Other: ___________

**A copy of the document may be requested from the Superfund Records Center.

Document Information

Document ID #: 1231650
File #: FTWFF 19.4
Site Name: Fort Wainwright, US Army

Institutional Controls
Restricted Use Boundary
Five Year Review
September 2006



AP-7162 (22.0-32.0)	1997	1998	1999	2000	2003	2005
COCs	NE	NE	NE	NE	NE/NA	NE

AP-6327 (5.0-15.0)	MCL	1997	1998	2000	2003	2005
Benzene	5	77	58	57	43J	34
1,1-Dichloroethene	7	U	U	U	U	U
cis-1,2-Dichloroethene	70	8.2J	8.2	7.2	7.4J	3.3
Vinyl Chloride	2	0.7	0.05J	0.4J	0.44J	0.22
Dieldrin	0.004	0.007J	0.005J	0.01J	0.0095J	0.0068/0.0092F
Aldrin	0.05	U	U	U	U	0.0027J/ND F

AP-6331 (3.5-13.5)	MCL	1997	1998	2000	2003	2005
Benzene	5	U	0.1J	U	U	U
1,1-Dichloroethene	7	U	U	U	U	U
cis-1,2-Dichloroethene	70	U	U	U	U	U
Vinyl Chloride	2	U	U	U	U	U
Dieldrin	0.004	2J	2.2	1.4	1.0	0.71/0.67F

AP-7280 (12.5-22.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE/NA	NE/NA

AP-6326 (3.5-13.5)	MCL	1997	1998	2000	2003	2005
Benzene	5	5.7	7	2	3.2	2.1
1,1-Dichloroethene	7	5.9	3J	1.8	3.0	2.2
cis-1,2-Dichloroethene	70	640	340	190	330	270
Vinyl Chloride	2	2	1J	0.6	0.9	0.61
Dieldrin	0.004	0.85	0.91	0.92	0.64	0.74/0.71F

AP-7279 (11.5-21.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE	NE

AP-6330 (2.7-12.7)	MCL	1997	1998	2000	2003	2005
Benzene	5	U	U	U	U	U
1,1-Dichloroethene	7	U	U	U	U	U
cis-1,2-Dichloroethene	70	U	U	U	U	U
Vinyl Chloride	2	U	U	U	U	U
Dieldrin	0.004	0.09	0.14	0.091	0.097	0.094/0.095F

AP-6328 (8.0-18.0)	MCL	1997	1998	2000	2003	2005
Benzene	5	U	U	U	U	U
1,1-Dichloroethene	7	U	U	U	U	U
cis-1,2-Dichloroethene	70	U	U	U	U	U
Vinyl Chloride	2	U	U	U	U	U
Dieldrin	0.004	0.16	0.16	0.19	0.18	0.15/0.15F

AP-7163 (12.0-22.0)	MCL	1997	1998	1999	2000	2001	2002	2003	2004	2005
Benzene	5	U	U	NA	U	NA	NA	0.11J	NA	U
1,1-Dichloroethene	7	U	U	NA	U	NA	NA	U	NA	U
cis-1,2-Dichloroethene	70	3.6J	1.7	NA	2.2	NA	NA	3.1	NA	2.7
Vinyl Chloride	2	U	U	NA	U	NA	NA	U	NA	U
Dieldrin	0.004	0.02J	0.03	0.02J	0.021	U	0.025	0.019	0.013	0.0098/0.011F

AP-7281 (12.5-22.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE/NA	NE/NA

AP-7282 (11.5-21.5)	MCL	1997	1998	2000	2001	2002	2003	2004	2005
Benzene	5	U	U	U	NA	NA	U	NA	U
1,1-Dichloroethene	7	U	U	U	NA	NA	U	NA	U
cis-1,2-Dichloroethene	70	U	U	U	NA	NA	U	NA	U
Vinyl Chloride	2	U	U	U	NA	NA	U	NA	U
Dieldrin	0.004	0.004J	0.007J	0.005J	U	0.0068	0.0063	0.0036	0.0051/0.006F
Heptachlor	0.4	U	U	0.002J	U	U	U	U	U

AP-6631 (3.7-13.7)	MCL	1997	1998	2000	2003	2005
Benzene	5	U	U	U	U	U
1,1-Dichloroethene	7	U	U	U	U	U
cis-1,2-Dichloroethene	70	U	U	U	U	U
Vinyl Chloride	2	U	U	U	U	U
Dieldrin	0.004	0.01J	0.01J	0.01J	0.011	0.012/0.015F

AP-6630 (9.5-19.5)	1997	1998	1999	2000	2003	2005
COCs	NE	NE	NE	NE	NE/NA	NE/NA

AP-7284 (8.5-18.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE	NE/NA

AP-6629 (11.5-21.5)	1997	1998	1999	2000	2003	2005
COCs	NE	NE	NE	NE	NE/NA	NE/NA

AP-7283 (17.5-27.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE	NE

LEGEND

MONITORING WELL

J = COMPOUND DETECTED BETWEEN THE METHOD DETECTION LIMIT AND METHOD REPORTING LIMIT, AND IS CONSIDERED AN ESTIMATE VALUE.

U = COMPOUND NOT DETECTED ABOVE THE METHOD REPORTING LIMIT

F = FILTERED SAMPLE RESULT

NE = NO EXCEEDANCES

NA = NOT ANALYZED

NE/NA = NO EXCEEDANCES IN COCs ANALYZED, NOT ALL COCs ANALYZED

MCL = MAXIMUM CONTAMINANT LEVEL

COCs = CHEMICAL(S) OF CONCERN

NOTES: MCL EXCEEDANCES ARE SHOWN IN BLUE

ANALYTICAL RESULTS REPORTED AS $\mu g/L$.

AT LOCATIONS WHERE DUPLICATE SAMPLES WERE TAKEN, THE HIGHEST RESULT IS SHOWN.

ONLY CONCENTRATIONS FOR REMEDIAL ACTION OBJECTIVE COCs ARE SHOWN. ALDRIN HAS NOT BEEN DETECTED DURING GROUNDWATER MONITORING.

SCREENED INTERVAL OF WELL IS SHOWN NEXT TO WELL NUMBER IN DATA BOX IN FEET BELOW GROUND SURFACE.

REFERENCE SAMPLE	CERTIFIED VALUE	DETECTED RESULT
Benzene	13.4	14
Toluene	NA	0.22
1,1-Dichloroethene	19.5	18
Vinyl Chloride	5.20	5.4
Aldrin	0.123	0.12/0.086 F
Dieldrin	0.133	0.13/0.11 F
4,4'-DDT	NA	U/0.0032J F

0 40 80 160

SCALE IN FEET

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

801 Drum Burial Site Groundwater Contamination Map

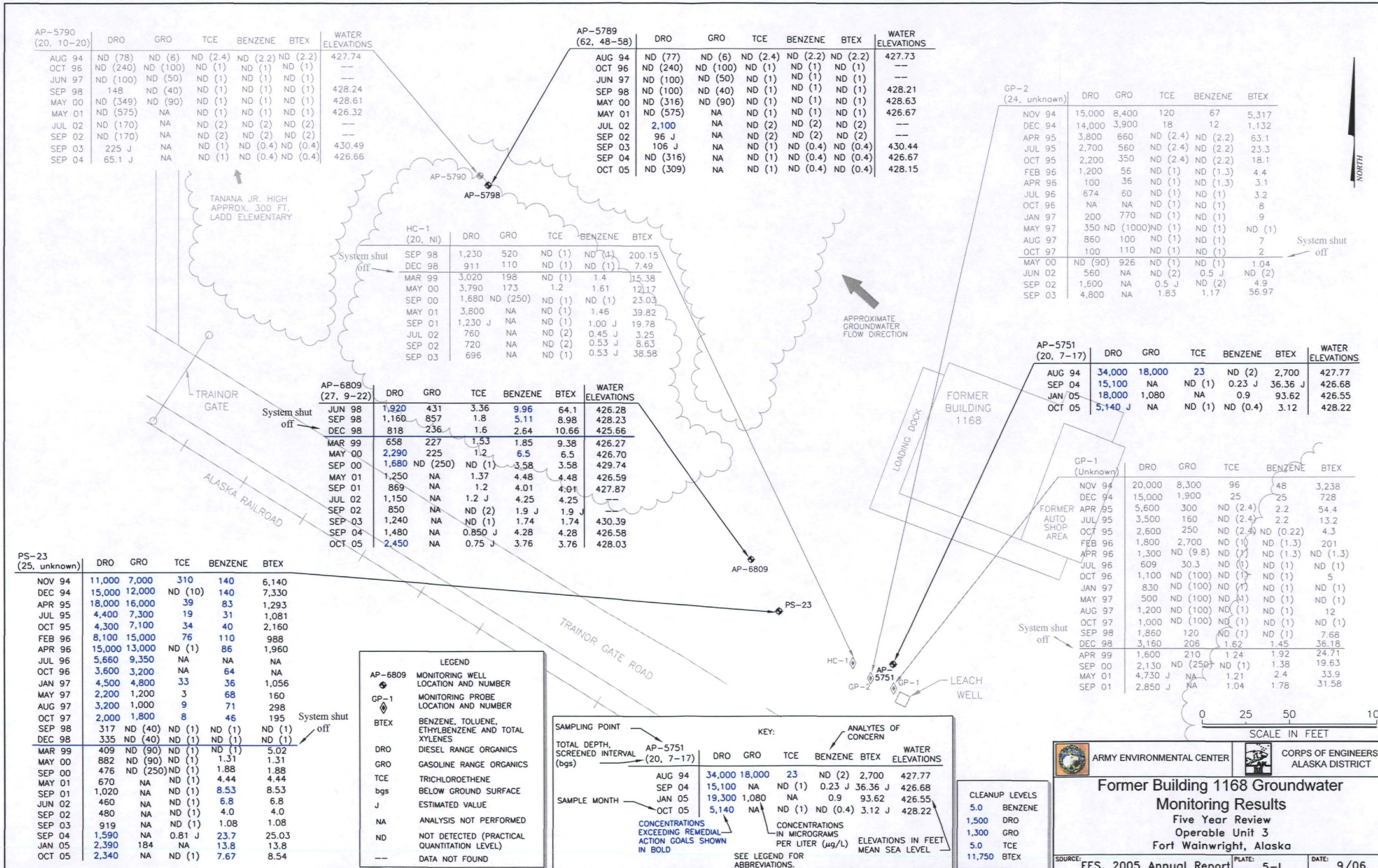
Five Year Review

Operable Unit 1

Fort Wainwright, Alaska

SOURCE: ENSR, 2005 Annual Report | PLATE: 4-1 | DATE: 9/06

746AF



AP-5790 (20, 10-20)	DRO	GRO	TCE	BENZENE	BTEX	WATER ELEVATIONS
AUG 94	ND (78)	ND (6)	ND (2.4)	ND (2.2)	ND (2.2)	427.74
OCT 96	ND (240)	ND (100)	ND (1)	ND (1)	ND (1)	--
JUN 97	ND (100)	ND (50)	ND (1)	ND (1)	ND (1)	--
SEP 98	148	ND (40)	ND (1)	ND (1)	ND (1)	428.24
MAY 00	ND (349)	ND (90)	ND (1)	ND (1)	ND (1)	428.61
MAY 01	ND (575)	NA	ND (1)	ND (1)	ND (1)	426.32
JUL 02	ND (170)	NA	ND (2)	ND (2)	ND (2)	--
SEP 02	ND (170)	NA	ND (2)	ND (2)	ND (2)	--
SEP 03	225 J	NA	ND (1)	ND (0.4)	ND (0.4)	430.49
SEP 04	65.1 J	NA	ND (1)	ND (0.4)	ND (0.4)	426.66

AP-5789 (62, 48-58)	DRO	GRO	TCE	BENZENE	BTEX	WATER ELEVATIONS
AUG 94	ND (77)	ND (6)	ND (2.4)	ND (2.2)	ND (2.2)	427.73
OCT 96	ND (240)	ND (100)	ND (1)	ND (1)	ND (1)	--
JUN 97	ND (100)	ND (50)	ND (1)	ND (1)	ND (1)	--
SEP 98	ND (100)	ND (40)	ND (1)	ND (1)	ND (1)	428.21
MAY 00	ND (316)	ND (90)	ND (1)	ND (1)	ND (1)	428.63
MAY 01	ND (575)	NA	ND (1)	ND (1)	ND (1)	426.67
JUL 02	**2,100**	NA	ND (2)	ND (2)	ND (2)	--
SEP 02	96 J	NA	ND (2)	ND (2)	ND (2)	--
SEP 03	106 J	NA	ND (1)	ND (0.4)	ND (0.4)	430.44
SEP 04	ND (316)	NA	ND (1)	ND (0.4)	ND (0.4)	426.67
OCT 05	ND (309)	NA	ND (1)	ND (0.4)	ND (0.4)	428.15

GP-2 (24, unknown)	DRO	GRO	TCE	BENZENE	BTEX
NOV 94	15,000	8,400	120	67	5,317
DEC 94	14,000	3,900	18	12	1,132
APR 95	3,800	660	ND (2.4)	ND (2.2)	63.1
JUL 95	2,700	560	ND (2.4)	ND (2.2)	23.3
OCT 95	2,200	350	ND (2.4)	ND (2.2)	18.1
FEB 96	1,200	56	ND (1)	ND (1.3)	4.4
APR 96	100	36	ND (1)	ND (1.3)	3.1
JUL 96	674	60	ND (1)	ND (1)	3.2
OCT 96	NA	NA	ND (1)	ND (1)	8
JAN 97	200	770	ND (1)	ND (1)	9
MAY 97	350	ND (1000)	ND (1)	ND (1)	ND (1)
AUG 97	860	100	ND (1)	ND (1)	7
OCT 97	100	110	ND (1)	ND (1)	2
MAY 00	ND (90)	926	ND (1)	ND (1)	1.04
JUN 02	560	NA	ND (2)	0.5 J	ND (2)
SEP 02	1,600	NA	0.5 J	ND (2)	4.9
SEP 03	4,800	NA	1.83	1.17	56.97

System shut off

HC-1 (20, NI)	DRO	GRO	TCE	BENZENE	BTEX
SEP 98	1,230	520	ND (1)	ND (1)	200.15
DEC 98	911	110	ND (1)	ND (1)	7.49
MAR 99	3,020	198	ND (1)	1.4	15.38
MAY 00	3,790	173	1.2	1.61	12.17
SEP 00	1,680	ND (250)	ND (1)	ND (1)	23.03
MAY 01	3,800	NA	ND (1)	1.46	39.82
SEP 01	1,230 J	NA	ND (1)	1.00 J	19.78
JUL 02	760	NA	ND (2)	0.45 J	3.25
SEP 02	720	NA	ND (2)	0.53 J	8.63
SEP 03	696	NA	ND (1)	0.53 J	38.58

System shut off

AP-5751 (20, 7-17)	DRO	GRO	TCE	BENZENE	BTEX	WATER ELEVATIONS
AUG 94	**34,000**	**18,000**	**23**	ND (2)	2,700	427.77
SEP 04	**15,100**	NA	ND (1)	0.23 J	36.36 J	426.68
JAN 05	**18,000**	1,080	NA	0.9	93.62	426.55
OCT 05	**5,140 J**	NA	ND (1)	ND (0.4)	3.12	428.22

AP-6809 (27, 9-22)	DRO	GRO	TCE	BENZENE	BTEX	WATER ELEVATIONS
JUN 98	**1,920**	431	3.36	**9.96**	64.1	426.28
SEP 98	1,160	857	1.8	**5.11**	8.98	428.23
DEC 98	818	236	1.6	2.64	10.66	425.66
MAR 99	658	227	1.53	1.85	9.38	426.27
MAY 00	**2,290**	225	1.2	**6.5**	6.5	426.70
SEP 00	**1,680**	ND (250)	ND (1)	3.58	3.58	429.74
MAY 01	1,250	NA	1.37	4.48	4.48	426.59
SEP 01	869	NA	1.2	4.01	4.01	427.87
JUL 02	1,150	NA	1.2 J	4.25	4.25	--
SEP 02	850	NA	ND (2)	1.9 J	1.9 J	--
SEP 03	1,240	NA	ND (1)	1.74	1.74	430.39
SEP 04	1,480	NA	0.850 J	4.28	4.28	426.58
OCT 05	**2,450**	NA	0.75 J	3.76	3.76	428.03

System shut off

GP-1 (Unknown)	DRO	GRO	TCE	BENZENE	BTEX
NOV 94	20,000	8,300	96	48	3,238
DEC 94	15,000	1,900	25	25	728
APR 95	5,600	300	ND (2.4)	2.2	54.4
JUL 95	3,500	160	ND (2.4)	2.2	13.2
OCT 95	2,600	250	ND (2.4)	ND (0.22)	4.3
FEB 96	1,800	2,700	ND (1)	ND (1.3)	201
APR 96	1,300	ND (9.8)	ND (1)	ND (1.3)	ND (1.3)
JUL 96	609	30.3	ND (1)	ND (1)	ND (1)
OCT 96	1,100	ND (100)	ND (1)	ND (1)	5
JAN 97	830	ND (100)	ND (1)	ND (1)	ND (1)
MAY 97	500	ND (100)	ND (1)	ND (1)	ND (1)
AUG 97	1,200	ND (100)	ND (1)	ND (1)	12
OCT 97	1,000	ND (100)	ND (1)	ND (1)	ND (1)
SEP 98	1,860	120	ND (1)	ND (1)	7.68
DEC 98	3,160	206	1.62	1.45	36.18
APR 99	1,600	210	1.24	1.92	24.71
SEP 00	2,130	ND (250)	ND (1)	1.38	19.63
MAY 01	4,730 J	NA	1.21	2.4	33.9
SEP 01	2,850 J	NA	1.04	1.78	31.58

System shut off

PS-23 (25, unknown)	DRO	GRO	TCE	BENZENE	BTEX
NOV 94	**11,000**	**7,000**	**310**	**140**	6,140
DEC 94	**15,000**	**12,000**	ND (10)	**140**	7,330
APR 95	**18,000**	**16,000**	**39**	**83**	1,293
JUL 95	**4,400**	**7,300**	**19**	**31**	1,081
OCT 95	**4,300**	**7,100**	**34**	**40**	2,160
FEB 96	**8,100**	**15,000**	**76**	**110**	988
APR 96	**15,000**	**13,000**	ND (1)	**86**	1,960
JUL 96	**5,660**	**9,350**	NA	NA	NA
OCT 96	**3,600**	**3,200**	NA	**64**	NA
JAN 97	**4,500**	**4,800**	**33**	**36**	1,056
MAY 97	**2,200**	1,200	3	**68**	160
AUG 97	**3,200**	1,000	**9**	**71**	298
OCT 97	**2,000**	**1,800**	**8**	**46**	195
SEP 98	317	ND (40)	ND (1)	ND (1)	ND (1)
DEC 98	335	ND (40)	ND (1)	ND (1)	ND (1)
MAR 99	409	ND (90)	ND (1)	ND (1)	5.02
MAY 00	882	ND (90)	ND (1)	1.31	1.31
SEP 00	476	ND (250)	ND (1)	1.88	1.88
MAY 01	670	NA	ND (1)	4.44	4.44
SEP 01	1,020	NA	ND (1)	**8.53**	8.53
JUN 02	460	NA	ND (1)	**6.8**	6.8
SEP 02	480	NA	ND (1)	4.0	4.0
SEP 03	919	NA	ND (1)	1.08	1.08
SEP 04	**1,590**	NA	0.81 J	**23.7**	25.03
JAN 05	**2,390**	184	NA	**13.8**	13.8
OCT 05	**2,340**	NA	ND (1)	**7.67**	8.54

System shut off

LEGEND

AP-6809	MONITORING WELL LOCATION AND NUMBER
GP-1	MONITORING PROBE LOCATION AND NUMBER
BTEX	BENZENE, TOLUENE, ETHYLBENZENE AND TOTAL XYLENES
DRO	DIESEL RANGE ORGANICS
GRO	GASOLINE RANGE ORGANICS
TCE	TRICHLOROETHENE
bgs	BELOW GROUND SURFACE
J	ESTIMATED VALUE
NA	ANALYSIS NOT PERFORMED
ND	NOT DETECTED (PRACTICAL QUANTITATION LEVEL)
--	DATA NOT FOUND

KEY:

SAMPLING POINT

TOTAL DEPTH, SCREENED INTERVAL (bgs)

ANALYTES OF CONCERN

AP-5751 (20, 7-17)	DRO	GRO	TCE	BENZENE	BTEX	WATER ELEVATIONS
AUG 94	**34,000**	**18,000**	**23**	ND (2)	2,700	427.77
SEP 04	**15,100**	NA	ND (1)	0.23 J	36.36 J	426.68
JAN 05	**19,300**	1,080	NA	0.9	93.62	426.55
OCT 05	**5,140**	NA	ND (1)	ND (0.4)	3.12 J	428.22

SAMPLE MONTH

CONCENTRATIONS EXCEEDING REMEDIAL ACTION GOALS SHOWN IN BOLD

CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

ELEVATIONS IN FEET MEAN SEA LEVEL

SEE LEGEND FOR ABBREVIATIONS.

CLEANUP LEVELS

5.0	BENZENE
1,500	DRO
1,300	GRO
5.0	TCE
11,750	BTEX

ARMY ENVIRONMENTAL CENTER

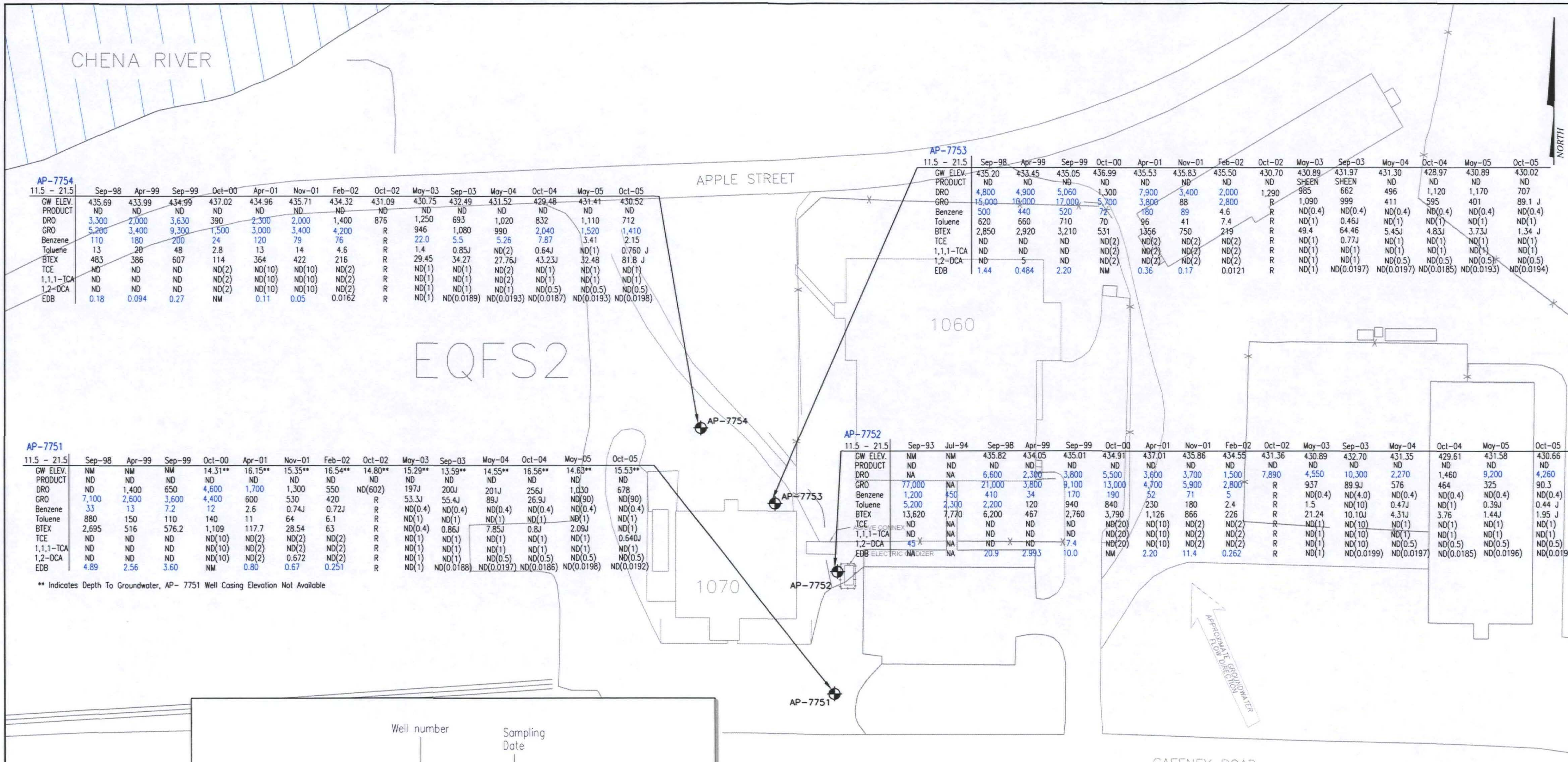
CORPS OF ENGINEERS ALASKA DISTRICT

Former Building 1168 Groundwater Monitoring Results

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE: FES, 2005 Annual Report | PLATE: 5-1 | DATE: 9/06

748AF



AP-7754

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05
GW ELEV.	435.69	433.99	434.99	437.02	434.96	435.71	434.32	431.09	430.75	432.49	431.52	429.48	431.41	430.52
PRODUCT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DRO	3,300	2,000	3,630	390	2,300	2,000	1,400	876	1,250	693	1,020	832	1,110	712
GRO	5,200	3,400	9,300	1,500	3,000	3,400	4,200	R	946	1,080	990	2,040	1,520	1,410
Benzene	110	180	200	24	120	79	76	R	22.0	5.5	5.26	7.87	3.41	2.15
Toluene	13	20	48	2.8	13	14	4.6	R	1.4	0.85J	ND(2)	0.64J	ND(1)	0.760 J
BTEX	483	386	607	114	364	422	216	R	29.45	34.27	27.76J	43.23J	32.48	81.8 J
TCE	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)
1,1,1-TCA	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)
1,2-DCA	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	0.18	0.094	0.27	NM	0.11	0.05	0.0162	R	ND(1)	ND(0.0189)	ND(0.0193)	ND(0.0187)	ND(0.0193)	ND(0.0198)

AP-7753

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05
GW ELEV.	435.20	433.45	435.05	436.99	435.53	435.83	435.50	430.70	430.89	431.97	431.30	428.97	430.89	430.02
PRODUCT	ND	ND	ND	ND	ND	ND	ND	ND	SHEEN	SHEEN	ND	ND	ND	ND
DRO	4,800	4,900	5,060	1,300	7,900	3,400	2,000	1,290	985	662	496	1,120	1,170	707
GRO	15,000	10,000	17,000	5,700	3,800	88	2,800	R	1,090	999	411	595	401	89.1 J
Benzene	500	440	520	72	180	89	4.6	R	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
Toluene	620	660	710	70	96	41	7.4	R	ND(1)	0.46J	ND(1)	ND(1)	ND(1)	ND(1)
BTEX	2,850	2,920	3,210	531	1356	750	219	R	49.4	64.46	5.45J	4.83J	3.73J	1.34 J
TCE	ND	ND	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	0.77J	ND(1)	ND(1)	ND(1)	ND(1)
1,1,1-TCA	ND	ND	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
1,2-DCA	ND	5	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	1.44	0.484	2.20	NM	0.36	0.17	0.0121	R	ND(1)	ND(0.0197)	ND(0.0197)	ND(0.0185)	ND(0.0193)	ND(0.0194)

AP-7751

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05
GW ELEV.	NM	NM	NM	14.31**	16.15**	15.35**	16.54**	14.80**	15.29**	13.59**	14.55**	16.56**	14.63**	15.53**
PRODUCT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DRO	ND	1,400	650	4,600	1,700	1,300	550	ND(602)	197J	200J	201J	256J	1,030	678
GRO	7,100	2,600	3,600	4,400	600	530	420	R	53.3J	55.4J	89J	26.9J	ND(90)	ND(90)
Benzene	33	13	7.2	12	2.6	0.74J	0.72J	R	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
Toluene	880	150	110	140	11	64	6.1	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
BTEX	2,695	516	576.2	1,109	117.7	28.54	63	R	ND(0.4)	0.86J	7.85J	0.8J	2.09J	ND(1)
TCE	ND	ND	ND	ND(10)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.640J
1,1,1-TCA	ND	ND	ND	ND(10)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
1,2-DCA	ND	ND	ND	ND(10)	ND(2)	0.672	ND(2)	R	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	4.89	2.56	3.60	NM	0.80	0.67	0.251	R	ND(1)	ND(0.0188)	ND(0.0197)	ND(0.0186)	ND(0.0198)	ND(0.0192)

** Indicates Depth To Groundwater, AP- 7751 Well Casing Elevation Not Available

AP-7752

11.5 - 21.5	Sep-93	Jul-94	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05
GW ELEV.	NM	NM	435.82	434.05	435.01	434.91	437.01	435.86	434.55	431.36	430.89	432.70	431.35	429.61	431.58	430.66
PRODUCT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DRO	NA	NA	6,600	2,300	3,800	5,500	3,600	3,700	1,500	7,890	4,550	10,300	2,270	1,460	9,200	4,260
GRO	77,000	NA	21,000	3,800	9,100	13,000	4,700	5,900	2,800	R	937	89.9J	576	464	325	90.3
Benzene	1,200	450	410	34	170	190	52	71	5	R	ND(0.4)	ND(4.0)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
Toluene	5,200	2,300	2,200	120	940	840	230	180	2.4	R	1.5	ND(10)	0.47J	ND(1)	0.39J	0.44 J
BTEX	13,620	7,770	6,200	467	2,760	3,790	1,126	866	226	R	21.24	10.10J	4.31J	3.76	1.44J	1.95 J
TCE	ND	NA	ND	ND	ND	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)
1,1,1-TCA	ND	NA	ND	ND	ND	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)
1,2-DCA	45	NA	ND	ND	7.4	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	NA	NA	20.9	2.993	10.0	NM	2.20	11.4	0.262	R	ND(1)	ND(0.0199)	ND(0.0197)	ND(0.0185)	ND(0.0196)	ND(0.0190)

Well number

Sampling Date

Screened interval (feet bgs)

Groundwater elevation in feet (ft) above sea level NAVD-88

Product thickness in feet (ft)

AP-7751

11.5 - 21.5	Sep-98	Apr-99	Sep-99
GW ELEV.	NM	NM	NM
PRODUCT	ND	ND	ND
DRO	ND	1,400	650
GRO	7,100	2,600	3,600
Benzene	33	13	7.2
Toluene	880	150	110
BTEX	2,695	516	576.2
TCE	ND	ND	ND
1,1,1-TCA	ND	ND	ND
1,2-DCA	ND	ND	ND
EDB	4.89	2.56	3.60

Concentration in in µg/L

Concentrations exceeding RAOs shown in blue.

	LEGEND:
AP-7751	Monitoring Well
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
TCE	Trichloroethylene
1,2-DCA	1,2-Dichloroethane
EDB	1,2-Dibromoethane
ND(4)	Not detected (detection limit)
RAO	Remedial Action Objective
R	Data rejected
J	Estimated Value
(ug/L)	Micrograms per Liter

Contaminant of Concern	RAO (µg/L)
DRO	1,500
GRO	1,300
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

Concentrations of Analytes in Groundwater
Building 1060
Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

SOURCE: FES, 2005 FFA MEETING | PLATE: 8-11 | DATE: 9/06

787AF

Appendix A

Appendix A

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
All	x	Draft OSWER Directive 9355.5-03B-P Comprehensive Five-Year Review Guidance			Draft
All	x	Interim Army Guidance for Conducting Five-Year Reviews	(No date on document)		
All		U.S. Army Restoration Program, Groundwater Monitoring Network, USACE	1991		
All	x	Federal Facilities Agreement	Mar-92	Once	
All		IRP FY99, 1st Quarter Update	Jan-99	Quarterly	
All		IRP FY01, 2nd Quarter Update	Apr-01	Quarterly	
All	x	Installation Action Plan, 2001	Spring 2001	Annual	
All		Draft Minutes RAB FWA	Jun-00		
All		Community Relations Activities to Support Areawide Community Relations Plan	Jul-00		
All		Draft SOP for Mgmt of IDW FWA AK Sep 00	Sep-00		
All		SOP for Mgmt of IDW at FWA March 2001	Mar-01		
All		Geohydrologic Network Status Report 1998-2000 TM: FWA April 2001	Apr-01		
All		Five-Year review kick-off meeting summary dated Apr 01	Apr-01		
All		Mid Year Report VOC Emission Tracking Program for Treatability Study Systems at Fort Wainwright, AK	Jul-01		
All	x	Five Year Review Report for Fort Wainwright, Wood-Canyon, Sep-01	Sep-01		
All		Ft Wainwright post wide groundwater Monitoring Well Database	Dec-01		
All		Post-wide Groundwater Monitoring Well Database, update , Northwind, 2001			
All		CD: FWA Postwide G/W monitoring well database, 2001 update			
All		Final Monitoring Well Replacement Report Ft. Wainwright AK/ENSR Int.	Jan-02		
All		Semi Annual Report VOC Emission Tracking Program for IRP Treatment Systems	Jul-02		
All		FINAL Areawide Community Involvement Plan, January 2003	Jan-03		
All		Final Areawide Community Involvement Plan	Jan-03		
All		Spill Prevention Control and Countermeasure Plan, FWA dated May 2003	May-03		
All		Semi-Annual Report VOC Emission Tracking Program for 2003 IRP Treatment Programs	Jul-03		
All		Draft Decommissioning Monitoring Wells at FWA and FRA Work Plan dated September 2003	Sep-03		
All		Final Management Plan, Decommissioning Monitoring Wells FWA, FRA dated October 2003	Oct-03		
All		Fort Wainwright Groundwater Monitoring Program 2003 Report dated October 2003	Oct-03		
All		Community Relations Activities to Support Areawide Community Relations Plan	Nov-03		
All		Annual Report: VOC Emission Tracking Program for 2003 IRP Treatment Systems FWA dated Jan 2004	Jan-04		
All		Draft Fort Wainwright EPCRA Tier II Report: January 1 - December 31, 2003 dated March 2004	Mar-04		
All		Draft Investigative-Derived Waste Management Area 2003 Annual Report dated March 2004	Mar-04		
All		Draft Investigative Derived Waste Management Area 2003 Annual Report	Mar-04		
All		SemiAnnual Report 2003, VOC Emission Tracking program for IRP Treatment systems, dated July 2004	Jul-04		
All		Semi-Annual Report VOC Emission Tracking Program for 2004 IRP Treatment Programs	Jul-04		
All		Postwide Well Survey Grid Drawings and Postwide Survey Database FWA June 2005	Jun-05		
All		Fort Wainwright Geohyrologic Network Status Report 1998 through 2002	Jan-06		
All		Draft 2005 Annual Report IDW Management Area, FWA	Feb-06		
All		Groundwater Monitoring, Picket Wells Report (June 96)	Jun-06		
1	x	OU1 ROD	Jun-97	One time plus amendments	
1		Remedial Design		Once	
		Records Search, Preliminary Source Evaluation, HLA	Feb-92		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		801 Drum Burial Site, Preliminary Source Evaluation 2, HLA	Apr-94		
		Management Plan, OU1, Remedial Investigation/Feasibility Study, ENSR	Aug-95		
	x	Remedial Investigation Report, ENSR	Sep-96		
	x	801 Drum Burial Site Supplemental 1996 Investigation , ENSR	Jan-97		
	x	Proposed Plan for Remedial Action at Operable Unit 1, Final RI/FS, ENSR	Feb-97		
		Feasibility Study, OU1, ENSR	Feb-97		
		Rhizoshpere Enhanced Phytoremediation Work Plan, ENSR	May-97		
		Final RA Work Plan	Apr-98		
		Work Plan FWA036 Phytoremediation Study Site Closure Confirmation Soil Sampling	Jan-03		
		Site Safety and Health Plan 801 Drum Burial Site Groundwater Monitoring	Mar-03		
		Final QA Project Plan 801 Drum Burial	Mar-03		
		Phytoremediation Study Site Decommissioning Work Plan	Aug-03		
		Phytoremediation Work Plan	Sep-03		
	x	Memo from Dianne Soderlund to Cristal Fosbrook RE: 801 Rhizosphere-Enhanced Phytoremediation Treatability Study Soils	July 26 2000		
		Release Investigation Report/Corrective Action Plan, Abandoned Birch Hill Underground Storage Tank Farm Sites, OU1, Ecology and Environment, Inc.			
1		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		Operations Final Report for Drummed Waste Removal, OHM	Feb-93		
		Remedial Action Report, ENSR	Jan-99		
		1999 anl phyto progress rpt (3rd annual progr rpt) ou1 fwa apr 00	Apr-00		
		Revised Preliminary Draft Remedial Action Report, OU1, ENSR Consulting and Engineering, Aug-00	Aug-00		
		Draft annual progres repot 2000 for rhizosphere-ehnaced phyto study fwa apr 01	Apr-01		
	x	2001 Interim Remedial Action Report, ENSR	May-01		
		Fourth and Final Annual Progress Report 2000 for Rhizosphere Enhanced Phytoremediation Study, OU1, ENSR Consulting and Engineering, Aug-01	Aug-01		
		Draft Phytoremediation Study Site Closure	Jan-03		
		Final Removal Action Report, Phytoremediation Study Site Decom.	Sep-05		
1		Drawings/ as-builts		See RD and RARs	
1		O&M Manuals and Reports		Once	
		Draft Bldg 1168 O&M Manual OU2 FWA	Jan-00		
		Draft Final O&MM Manual 801 Drum Burial Site, FWA Sep 00	Sep-00		
		Final Operations, Maintenance and Monitoring for Operable Unit 1, 801 Drum Burial Site treatment system, ENSR Consulting and Engineering, Dec-00	Dec-00		
1		GW, SW, and air monitoring plans & reports		Annual	
		Third Annual Progress Report Rhizosphere Enhanced Phytoremediation Treatability Study	Apr-00		
		Mar 2000 G/W Sampling-801 Drum Burial Site, Jun 2000	Jun-00		
		OU1 CY-2000 Annual Groundwater Monitoring Report	Apr-01		
		Annual Monitoring Report for 801 Drum Burial Site at Fort Wainwright, OU1, ENSR Consulting and Engineering, Apr-01	Apr-01		
		Final 2002 801 Drum Burial Site Groundwater Monitoring Report FWA AK May 02	May-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Draft QA Plan 801 Drum Burial Site	Dec-02		
		Final Site Safety and Health Plan 801 Drum Burial Site	Mar-03		
		Final SSHP & QAPP for 801 Drum Burial Site GW Monitoring, FWA	May-03		
		Final CLOSES Evaluation 801 Drum Site, FWA dated April 2004	Apr-04		
		Final 2003 Annual Groundwater Monitoring, 801 Drum Burial Site	Jun-04		
		2005 Quality Assurance Project Plan Addendum, OU1 Drum Burial Site	Mar-05		
		Draft 2005 Annual Groundwater Monitoring Report 801 Drum Burial Site dated June 2005	Jun-05		
		RA Phytoremediation Study Site Decommissioning	Sep-05		
		Final 2004 annual Report for the 801 Drum Burial Site Groundwater Monitoring	Mar-06		
1		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		December 1996 Quarterly Well Sampling 801 Drum Burial Site, ENSR	Apr-97		
		March 1997 Quarterly Well Sampling, 801 Drum Burial Site, ENSR	Jul-97		
		June 1997 Quarterly Well Sampling, 801 Drum Burial Site, ENSR	Oct-97		
		Letter Report: Sept. 97 Quarterly Well Sampling 801 DBS, ENSR	Jan-98		
		Interim Progress Rpt., Rhizo-Enhanced Phyto Treatability Study, ENSR	Jan-98		
		Letter Report: March 98 Groundwater Sampling 801 DBS, ENSR	Jun-98		
		2nd Annual Progress Report, Rhizo-Enhanced Phtyo Treatability Study, ENSR	Mar-99		
		March 1999 Annual Well Sampling, 801 Drum Burial Site, ENSR	Apr-99		
		1999 Annual Phytoremediation Progress Report (3rd Annual), ENSR	Apr-00		
		March 2000 Groundwater Sampling, 801 Drum Burial Site, ENSR	Jun-00		
		March 2001 Annual Well Sampling, 801 Drum Burial Site, ENSR	Apr-01		
		2001 Annual Groundwater Monitoring-801 Drum Burial Site letter report	Apr-01		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2000	Jul-01		
	x	Fourth Annual Progress Report - Rhizosphere-Enhanced Phytoremediation, ENSR	Aug-01		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2002	May-02		
		Trip Report Phytoremediation Study Site Decommissioning 9/26,10/1, 10/7, 11/20	Dec-03		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2003	Apr-04		
		CLOSES Evaluation 801 Drum Burial Site Ft. Wainwright, AK	Apr-04		
		Memorandum Rport of Chemical Findings, Phytoremediation Study Site Decommissioning Postexcavation Confirmation Soil Sampling	Nov-04		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2004	Feb-06		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2005	Mar-06		
2	x	OU2 ROD	Mar-97	One-time plus amendments	
2		Remedial Design		Once	
		OU2 Final Preliminary Source Evaluation 2, Phase 2, DRMO, HLA	Jul-93		
		North Post Site, Soil Pile Remediation, Project Report, Laidlaw Env. Svs.	Apr-94		
		OU2 Final Remedial Investigation/Feasibility Study Management Plan, HLA	Apr-94		
	x	OU2 Final Remedial Investigation Report, HLA	Jan-96		
	x	Proposed Plan for Remedial Action at Operable Unit 2, Army	Apr-96		
		Work Plan Record of Decision, Design Study, OU 2, Hart Crowser	Jan-97		
	x	Remedial System Design Report, ROD Design Study, OU2, Hart Crowser	Feb-97		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Final Remedial Design/Remedial Action Plan, OU2, Bldg 1168 Source Area, HLA	Dec-97		
		Record of Decision, Design Study, OU 2, Hart Crowser	Feb-99		
		Draft Work Plan ADDENdum, DRMO Treatment System OU2, May 2001	May-01		
		Draft OU2 tmt & mon operations work plan SSHP & Schedule Oct 2001	Oct-01		
		Technical Memorandum Level Survey of Soil and Groundwater Monitoring Points at the DRMO Yard	Mar-02		
		Technical Memorandum Picket Well Analysis DRMO Yard	May-02		
		DRMO5 Treatment System Modification 35% Design Technical Memorandum	Jun-02		
		DRMO1 Tretament System Modification 35% Design Technical Memorandum	Jun-02		
		Technical Memorandum Recommended Soil Boring Locations West of DRMO Yard	Jun-02		
		Technical Memorandum Soil Vapor Extraction Well Sampling 3 Part AS/SVE Treatment System DRMO Yard	Sep-02		
		Technical Memorandum Groundwater Probe Sampling and Analysis DRMO-4 Subarea	Sep-02		
		Treatment and Monitoring Operations Work Plan, QA Project Plan and Site Health and Safey Plan	May-03		
		DRMO-1 Historical Data Review Technical Memorandum	Jul-03		
		Final 2003 Treatment and Monitoring Operations Work Plan OU2	Aug-03		
		Final Work Plan Addendum for Decommissioning of the Bldg 1168 (3Party) Site dated September 2003	Sep-03		
		Draft 2004 Treatment and Monitoring Operations Work Plan	Oct-03		
		Final 2004 Treatment and Operations Work Plan OU2 Ft. Wainwright AK	Mar-04		
		Draft 3 Part System Augmentation Work Plan OU2	Sep-04		
		2005 Work Plan OU2	May-05		
		Draft Revision 1 Site Characterization and Remediation Work Plan	Jun-05		
		Natural Attenuation Monitoring Work Plan	Mar-06		
		Final Monitoring Well and Soil Boring Installation Work Plan	Mar-06		
		Draft Work Plan, ROD Design Study			
		2004 Draft Project Schedule, OU2, Treatment and Monitoring Operations			
2		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		Remedial Action Report, North Post Source Removal Action, OHM Rem. Svs.	May-97		
	x	Remedial Action Report, Bldg. 1168, Hart Crowser	May-99		
		Monitoring Report Aug 1998 - April 1999 North Post DRMO1 and DRMO5 sites	Jun-99		
		Remedial Action Report, DRMO, Final Revision 01, ENSR	Aug-99		
		Remedial Action Report OU2	Aug-99		
		RAR, DRMO yard & Bldg 1168, OU2, FWA, Final	Jan-00		
		Final 1999 Comprehensive Annual Monitoring Report, DRMO, OU2, Hart Crowser, Nov-00	Nov-00		
		Draft 2000 Annual Monitoring Report, Bldg 1168 site TS, OU2, Jan 01	Jan-01		
		2000 Remediation System Operations Report, DRMO, Hart Crowser	Mar-01		
		Rem Sys Ops Draft Rpt at FWA Apr 01 (ROD DS)	Apr-01		
		Draft Comprehensive Annual Monitoring Report at FWA May 2001	May-01		
		Draft 01 Field season mon report ou2 bldg 1168 tx, fwa jan 02	Jan-02		
		OU2 DRMO 2001 Comprehensive Report, FWA AK May 2002	May-02		
		Tech Memo: DRMO-1 Treatment System Expansion 35%, OU2, Northwind, Jun-02	Jun-02		
		Tech Memo: DRMO-5 Treatment System Expansion 35%, OU2, Northwind, Jun-02	Jun-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Tech Memo: Probe Sampling & Analysis DRMO-4 Sub Area, OU2, Northwind, Sep-02	Sep-02		
		Tech Memo: Soil Vapor Extraction Well Sampling 3-Party AS/SVE Treatment System DRMO Yard, OU2, Northwind, Sep-02	Sep-02		
		Annual Report Addendum, Operable Unit 2, dated May 27, 2003	May-03		
		Tech Memo: DRMO-1 Historical Data Review, OU2, Northwind, Jul-03	Jul-03		
		Final 2002 Annual Report, Operable Unit 2 dated October 2003	Oct-03		
		Final Tech Memo - Flow Meter Replacement DRMO 3-Party AS/SVE Treatment System, Dec 31, 2003	Dec-03		
		Draft Technical Memorandum DRMO Yard Groundwater Trichloroethene/Tetrachloroethene Concentration Trend Analysis	Jan-04		
		Final CLOSES Evaluation Bldg 1168 Site, FWA dated January 2004	Jan-04		
		Final CLOSES Evaluation DRMO Yard, FWA dated March 2004	Mar-04		
		Technical Memorandum: Soil Gas Screening Survey Results, DRMO-1 & DRMO-4 Subareas, dated August 2004	Aug-04		
		Final 2003 Annual Report OU2 dated December 2004	Dec-04		
		Final 2004 DRMO Annual Report, OU2, FWA	Dec-05		
		2005 Monitioring Report OU2	Mar-06		
		Biodegradation/Volatilization Bench Scale Treatability Study Results for TPH Contaminated Soils Located at North Post, OU2, Laidlaw Env. Svcs.			
		Final Remedial Action Report, DRMO Yard and Bldg 1168, OU2, ENSR, 2000			
		DRMO Soil Sample Results, Bldg 5001			
2		Drawing/ as-builts		See RD and RARs	
2		O&M Manuals and Reports		Once	
		1997 Remediation System Operation Report, ROD Design Study, Hart Crowser	May-98		
	x	Remediation System Operations Report, DRMO, Hart Crowser	Mar-00		
		Final OM&M DRMO, Vol I & II, Hart Crowser	Dec-00		
		OM&M Manual, OU2 ROD, Design Study Treatment System, Vol I, Hart Crowser	Jun-01		
		Final Operations, Maintenance and Monitoring Manual, OU2, Hart Crowser, Jun-01	Jun-01		
		Final Operations, Maintenance, Monitoring Report, Bldg 1168, OU2, Hart Crowser, Dec-00	Dec-02		
		Final Work Plan Addendum Decommissioning and Removal of Treatment System, Building 1168 3 Party Ft. Wainwright Ak	Sep-03		
		Final 2002 Annual Report OU2 Ft. Wainwright AK	Oct-03		
		Technical Memorandum Soil Gas Screening Survey Results DRMO1 and 4 Subareas OU2	Aug-04		
		Final 2003 Annual Report	Dec-04		
		Draft Final O&M Manual RODDesg Study Trmt Study FWA AK			
2		GW, SW, and air monitoring plans & reports		Annual	
		Technical Memorandum North Post and DRMO Yard TS, Harding Lawson	Jun-97		
		1996 Annual Report, Bldg 1168 Treatability Study, Harding Lawson	Aug-97		
		1997 Annual Report, Bldg 1168, Treatability Study, Hart Crowser	Sep-98		
		Chemical Data Report, Spring 2000, Groundwater Monitoring, DRMO Picket Wells., OU2, Corps of Engineers, Alaska District, Sep-00	Sep-00		
		DRMO Final 1999 Comprehensive Annual Monitoring Report, Hart Crowser	Nov-00		
		Building 1168 2000 Annual Monitoring Report, Hart Crowser	Jan-01		
		DRMO 2000 Comprehensive Annual Monitoring Report, Hart Crowser	Jul-01		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Tech Memo Groundwater Probe Sampling and Analysis, DRMO-4 Subarea Sept 2002	Sep-02		
		tech Memo SVE Well Sampling, 3-Party AS/SVE System, September 2002	Sep-02		
		Draft Tech Memo: DRMO Yard GW Trichloroethene/Tetrachloroethene Concentration Trend Analysis Dec 2003	Dec-03		
		Sampling Data Report Spring 2004 Groundwater Monitoring Event	Aug-04		
		Sampling Data Report, OU2 Fall 2004 Groundwater Monitoring Report, November 2004	Nov-04		
2		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		Technical Memorandum, Oct 1996, Quarterly Monitoring Results, Building 1168, Harding Lawson	Feb-97		
		Technical Memorandum, Apr 97, Quarterly Monitoring Results, Building 1168 TS, Harding Lawson	Sep-97		
		Picket Well Installation, DRMO, Hart Crowser	Nov-97		
		Technical Memorandum, July & Oct 97 Quarterly Monitoring Results Bldg 1168, Harding Lawson	Jan-98		
		Former Building 1168 Release Investigation, Hart Crowser	May-98		
		Quarterly Monitoring Report, Nov 97-Apr 98, Bldg 1168 TS, Hart Crowser	Jun-98		
		Quarterly Monitoring Report, Building 1168, Treatability Study, Hart Crowser	Aug-98		
		Monitoring Report, Aug-Nov 1998, Bldg 1168, Hart Crowser	Jan-99		
		Picket Well Sampling Report, Apr 99, Sampling Event, OU 2 DRMO	May-99		
		Picket Well Sampling Report, Oct 99, Sampling Event, OU 2 DRMO	Oct-99		
		March 30, 2000, Groundwater Sample Results, Bldg 1168, OU2, Hart Crowser, Aug-00	Aug-00		
	x	Chemical Data Report, Groundwater Monitoring, DRMO Picket Wells, COE	Sep-00		
		Final 1999 Comprehensive Monitoring Report, Hart Crowser	Nov-00		
		Picket Well Sampling and Three Party Treatment Systems Operation Technical Memorada, OU2, Fairbanks Environmental Services, Oct-01	Oct-01		
		OU2 Oct 01 Picket well sampling&3P tmt systm op TMs, Nov 2001	Nov-01		
		OU2 DRMO Picket Well Sampling Results Tech Memo FWA AK May 2002	May-02		
		Tech Memo: Level Survey of Soil & G/W monitoring points at DRMO Yard, OU2, Northwind, Mar-03	Mar-03		
3	x	OU3 ROD	Apr-96	One-time plus amendments	
3		ESD	Sep-02	One-time	
3		Remedial Design		Once	
		Pilot Study Plan Underground Storage Tank Release Investigation	Jan-96		
		OU 3, Remedial Design/Remedial Action Statement of Work, COE	Apr-96		
		Final Work Plan Design Verification Study, Hart Crowser	Sep-96		
		60 % Design, Drawings, Cost Estimate, Construction Specifications, Design Verification Study, HC	May-97		
		1998 Field Season Work Plan	Mar-98		
		Site Investigation and treatabilty Study Work Plan MP 2.7 and 3.0	Aug-98		
		1998 Monitoring Report Design Verification Study	May-99		
		Final Design Submittal POL Source Removal	Aug-99		
		Fairbanks-Eielson Pipeline MP3.0 Soil Excavation and Ex-situ Treatment plan	Apr-00		
		2000 Work Plan, Swaim-Hart Crowser	May-00		
		1999 Monitoring Report Design Verification Study	May-00		
		Valve Pit A Draft Operations and Maintenance Plan	Jun-00		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Draft Operations, Maintenance and Monitoring Plans, Valve Pit A and the Eight Car Header, OU3, Hart Crowser, Sep-00	Sep-00		
		Oxidizer Cost/Benefit Analysis Report for OU3, OU5 and other areas at Ft. Wainwright Ak	Apr-01		also in OU5
		2000 Monitoring Report Design Verification Study	May-01		
		Work Plan, SAP, QAPP, and HSP, Fairbanks Environmental Services, OU3, Nov-01	Nov-01		
		Assessment of MP 2.7&3.0 source areas, OU3, FWA, Dec 2001	Dec-01		
		2002 Work Plan Summary OU3 Operation and Maintenance	Apr-02		
		OU3 Draft Waste Management Plan, FWA AK April 2002	Apr-02		
		Air Sparge Probe Rehabilitation Work Plan	Jun-02		
		MP 2.7 and 3.0 Treatment Cell Closure Plan	Nov-02		
		MP 2.7 and 3.0 Treatment Cell Decommissioning and Sampling Plan Jan 2003	Jan-03		
		2003 Work Plan, Operable Unit 3, Fort Wainwright, Alaska dated June 2003	Jun-03		
		Final 2004 Work Plan OU3, FWA, FES, Mar-04	Mar-04		
		Final CLOSES Evaluation MP 2.7 dated June 2004	Jun-04		
		Final CLOSES Evaluation MP 3.0 dated June 2004	Jun-04		
		2005 Work Plan Operable Unit 3 Fort Wainwright AK	Mar-05		
		2006 Work Plan Draft	Feb-06		
		Design Verification Study, Draft 96 Modeling Reports			
3		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		1996 Monitoring Report, Design Verification Study, Hart Crowser	Mar-97		
		Field Status Report, OU 3, Swaim-Hart Crowser	Nov-99		
		Implementation and Operations Plan, Hart Crowser	Dec-99		
		Bedrock & Structure Char & Blt TF: TFS Birch Hill Fuel	May-00		
		99 Monitoring Report, DVS, OU3, FWA May 00	May-00		
		1999 Monitoring Report, North Post/DRMO 1 & 5, Hart Crowser, Jun-00	Jun-00		
		OU3 Preliminary Draft Remedial Action Report at FWA May 2001	May-01		
		2000 Comprehensive Monitoring Report, OU3, Hart Crowser, May-01	May-01		
		2001 Monitoring Report Operable Unit 3 Fort Wainwright AK	Mar-02		
		Assessment of MP 2.7 and 3.0 Source Areas, OU3 FWA AK May 2002	May-02		
		Explanation of Significant Differences	Sep-02		
		Interim Remedial Action Report	Sep-02		
		Former Buildings 1128, 1129, 1130 Investigation	Nov-02		
		Final 2003 OU3 Annual Monitoring Report dated March 2004	Mar-04		
		CLOSES Evaluation MP 3.0 Ft. Wainwright AK	Jun-04		
		Draft Report, CLOSES Evaluation, Birch Hill Tank Farm, FWA, dates September 2004	Sep-04		
		Technical Memorandum MP 2.7 and MP 3.0 Site Survey	Sep-04		
		2004 Monitoring Report Operable Unit 3 Fort Wainwright AK	Mar-05		
		Technical Memorandum Decommisssioning of Valve Pit B and Valve Pit C Treatment Systems	Jul-05		
		MP2.7 and 3.0 Treatment Cells Decommissioning Report Operable unit 3 Fort Wainwright, Alaska	Sep-05		
		2005 Monitoring Report Operable Unit 3 Fort Wainwright AK	Mar-06		
		Sampling Data Report, OU3 Spring Sampling Event 2004, COE-FES			

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
3		Drawing/ as-builts		See RD and RARs	
		95% Design Analysis OU3, Area 1A Birch Hill TF, and Drawings, Ecology and Environment	Mar-97		
3		O&M Manuals and Reports		Once	
		Draft OM&M Manual, Valve Pit A & Eight Car Header, OU 3, Hart Crowser	Sep-00		Remaining OM&M Plans on hold pending EPA and DEC comments
		Remedial Systems Operations Report (ROD DS), Hart Crowser, Apr-01	Apr-01		
		Treatment Systems Operations, Maintenance, Monitoring Manuals, OU3, Hart Crowser, Jun-01	Jun-01		
		OM&M Manual, Birch Hill Tank Farm Product Recovery System (addendum to 2001) dated Nov 2002	Nov-02		
		Operation, Maintenance and Monitoring Manual Birch Hill Tank Farm Product Recovery Treatment System	Jan-03		
		2003 Revisions to OM&M Slipsheets, OU3, FWA, dated August 2004	Aug-04		
3		GW, SW, and air monitoring plans & reports		Annual	
		Birch Hill Tank Farm, Groundwater Investigation, Hart Crowser	Jul-98		
	x	Hydrological Evaluation of Remedial Area 1B	Dec-98		
		Monitoring Report, Design Verification Study, Hart Crowser	May-99		
		ROLF Groundwater Modeling	Oct-99		
		Summary of Hydrogeologic Investigation at Birch Hill Tank Farm, CRREL	Dec-99		
	x	Monitoring Report, Design Verification Study, Hart Crowser	May-00		
		Chemical Data Quality Assessment Report for Aug-Sep 00, Groundwater Monitoring at Mileposts 2.7, 3.0 & 15.75, OU3, Corps of Engineers, AK Dist., Feb-01	Feb-01		
		Birch Hill Tank Farm Monitoring Well Installation & Sampling, OU3, Corps of Engineers, AK Dist., Feb-01	Feb-01		
		G/W Flow Meas w/in OU3 fwa from Aug 95-Dec 00, March 2001	Mar-01		
		Birch Hill Tank Farm Monitoring Well Installation and Sampling Technical Memorandum	Mar-01		
		Groundwater monitoring Report for the Railroad Off Loading Facility	Apr-01		
	x	2000 Comprehensive monitoring report	May-01		
		Groundwater Modeling Report for RA1B, OU3, CH2M Hill, Jun-01	Jun-01		
		Birch Hill Tank Farm Aquifer Test	Jan-03		
		Birch Hill Tank Farm Tracer Test	Jan-03		
		2003 Technical Memorandum Spring Groundwater Sampling Event	Jun-03		
		Documentation of Operable Unit 3 FEFLOW Model	Feb-04		
		2004 Technical Memorandum Spring Groundwater Sampling Event	Jun-04		
3		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		Quarterly Monitoring Report, MP 15.75, Treatability Study, Hart Crowser	Feb-97		
		1996 Monitoring Report, Design Verification Study, Hart Crowser	Mar-97		
		Quarterly Monitoring Report, MP 15.75, Treatability Study, Hart Crowser	Jun-97		
		Quarterly Monitoring Report, MP 15.75, Treatability Study, COE	Nov-97		
		Quarterly Monitoring Report, MP 15.75, Treatability Study, Hart Crowser	Feb-98		
		1998 Monitoring Report, DVS	May-99		
	x	1999 Comprehensive monitoring report, Hart Crowser	May-00		
		Groundwater Flow Measurements within OU 3, Aug 95-Dec 00, CRREL	Dec-00		
		Chemical Data QAR for Aug-Sep 00, Groundwater Monitoring at MP2.7, 3 and 15.75, COE	Feb-01		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Groundwater Flow Measurements from Aug 95-Dec 00, Mar 01., OU3, CRREL, Mar-01	Mar-01		
		Bentley Trust Well Logs, OU3, Corps of Engineers, AK Dist., Jun-01	Jun-01		
		Tech Memo: Fall 2003 Sampling Data Report, OU3 dated January 2003	Jan-03		
		CD ONLY: 2003 Fall Groundwater Sampling Event, EDF corrected files dated Jan 15, 2003	Jan-03		
		Sampling Data Report: Spring 2003 Gw, dated June 23, 2003	Jun-03		
		Tech Memo: Documentation of OU3 FEFLOW Model, FWA dated February 2004	Feb-04		
		Technical Memorandum: FEFLOW Groundwater Modeling Analysis, OU3, dated September 2004	Sep-04		
		Geologic Setting of the Birch Hill Tank Farm OU3 dated January 2005	Jan-05		
		Sampling Data Report for Ft. Wainwright, OU3 Fall Sampling Event 2004	Fall 2004		
		Operable Unit 3 Spring 2003 EDF, EDCC files, tech memo, sampling results, chain of custody forms	Spring 2003		
		Sampling Data Report, OU3 Spring Sampling Event 2004	Spring 2004		
		Sampling Data Report for FWA Spring Sampling Event 2005	Spring 2005		
		Technical Memorandum, Summer 2003 Sampling Data Report, OU3	Summer 2003		
		Tech Memo: Sampling Data Report OU3 2004 Winter Groundwater Sampling Event	Winter 2004		
		Tech Memo: Sampling Data Report OU3 2004 Winter Groundwater Sampling Event EDF and Draft EDMS	Winter 2004		
		CD: Birch Hill Groundwater Model (FEFLOW/PEST) Input and Output files (5 separate runs)			
		EDF and draft EDMS deliverables: Sampling Data Report, OU3 Spring Sampling Event 2004			
		2003 Fall Groundwater Sampling Event OU3 EDF files, EDMS files			
		Birch Hill Tank Farm Monitoring Well Installation and Sampling, COE			Confirm date of issuance
4	x	OU4 ROD	Sep-96	One-time plus amendments	
4		Remedial Design		Once	
		Remedial Investigation Report OU4	Nov-94		
		Risk Assessment Report OU4	Aug-95		
		Draft SSHP Groundwater Monitoring Landfill Feb 2001	Feb-01		
		OU4 landfill draft g/w monitoring work plan at FWA Feb 2001	Feb-01		
		Draft work plan for monitoring well replacement fwa Aug 2001	Aug-01		
		OU4 Site Specific Safety and Health Plan	Jun-02		
		Final Work Plan for Groundwater Monitoring and Data Analysis at Landfill October 2002	Oct-02		
		Work Plan for GWMonitoring and Data Analysis at the CSY October 2002	Oct-02		
		Draft Groundwater Monitoring and Data Analysis at the Landfill Source Area Work Plan	May-03		
		Final Investigative Derived Waste management Area Operation and Maintenance Plan	Aug-03		
		Final Work Plan Groundwater Monitoring and Data Analysis at the Coal Storage Yard Source Area	Aug-03		
		Final Work Plan Groundwater Monitoring and Data Analysis at the Landfill Source Area	Aug-03		
		Final Coal Storage Yard Remediation System Decommissioning Work Plan	Apr-04		
		Final 2004 Work Plan, Groundwater Monitoring and Data Analysis at the Landfill Source Area, Sept 2004	Sep-04		
		2005 Work Plan Groundwater Monitoring and Data Analysis at the Landfill Source Area dated May 2005	May-05		
		Final 1999 Design Verification Study Report, CSY, DOWL/Ogden			Confirm date of issuance
		Landfill RA Final, Work Plan			
		Draft 2003 Work Plan for GW Monitoring and Data Analysis at the CSY Source Area			
		Draft 2003 Work Plan for GW Monitoring and Data Analysis at the Landfill Source Area			
		Draft 2004 Landfill Work Plan, SAP, QAPP, HSP			

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
4		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		Landfill Remedial Action Final Work Plan	Dec-98		
		Final Remedial Action Report, Landfill, DOWL/Ogden	Mar-99		
		Final Remedial Action Report, Coal Storage Yard (CSY), DOWL/Ogden	Apr-99		
		Sep 99 Landfill Cap inspection report	Sep-99		
		final 1999 DVS rpt CSY ou4 FWA Sep 00	Sep-00		
		Final 1999 Design Verification Study Report, Coal Storage yard, OU4, Dowl/Ogden Joint Venture, Sep-00 OU4, Dowl/Ogden Joint Venture, Dec-00	Dec-00		
		Draft 00 System Mon Rpt, TS, CSY, FTWA, Jan 01	Jan-01		
		Oxidizer cost/benefit analysi rpt for ou3/ou5 & FWA Apr 01	Apr-01		
		Final monitoring report CSY 2000 dated Oct 2001	Oct-01		
		Landfill, Final Monitoring Well Report, OU4, ENSR, Jan-02	Jan-02		
		Draft Landfill 2001 Annual Report FWA AK May 2002	May-02		
		Investigated Derived Waste Report OU4 Coal Storage Yard September 2002	Sep-02		
		Investigated Derived Waste Report OU4 Landfill September-October 2002	Oct-02		
		Soil Boring Installation Action Report for Coal Storage Yard, November 2002	Nov-02		
		Investigated Derived Waste Report OU4 Landfill September-October 2002, OU4, North Wind, January-03	Jan-03		
		Final 2002 Annual Report Coal Storage Yard	Jul-03		
		Final 2002 Annual Report Landfill	Jul-03		
		Investigative Derived Waste Report for the OU4 CSY June 2003 groundwater monitoring dated August 2003	Aug-03		
		Investigative Derived Waste Report for the OU4 Landfill May-June 2003 groundwater monitoring dated August 2003	Aug-03		
		Investigative-Derived Waste Report for the OU4 CSY Sept-Oct 2003 Well Decom and GW event dated 21 Nov 03	Nov-03		
		Investigative-Derived Waste Report for the OU4 Landfill, September 2003 GW event dated 21 November 2003	Nov-03		
		Technical Memorandum Coal Storage Yard Remediation System Decommissioning	Aug-04		
		Final 2003 Annual Report Coal Storage Yard	Sep-04		
		Final 2003 Annual Report Landfill	Sep-04		
		Site Assessment Report-Soil removal at FTP Fire Burn Pits			
		Draft 1999 DVS Report, CSY, OU4, FWA AK			
4		Drawing/ as-builts		See RD and RARs	
		Site Plan Landfill Cap Project, DOWL/Ogden	Jun-97		
4		O&M Manuals and Reports		As-needed	
		Final Operations, Maintenance & Monitoring Manual, Coal Storage Yard, Vol. I and II, OU4, Hart Crowser, Jan-01	Jan-01		
		Final Operations, Maintenance and Monitoring Report, Landfill, OU4, Hart Crowser, Jan-01	Jan-01		
4		GW, SW, and air monitoring plans & reports		Annual	
		Final 1997 System Monitoring Report, Treatment System, CSY, DOWL/Ogden	Jul-97		
		Rev Final 98 Sep & Dec Landfill G/W Samp Report, OU4 FWA	Dec-98		
		Final Groundwate Sampling Report	May-99		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Draft Aug G/W Sampling Report Landfill OU4 Jan 00	Jan-00		
		Groundwater Sampling Report, Draft, Landfill Monitoring Wells, OU4, Dowl/Ogden Joint Venture, Mar-00	Mar-00		
		Aug 99 G/w Sampling Report Final OU4Aug 2000	Aug-00		
		Final 1999 System Monitoring Report Treatment System Coal Storage Yard	Sep-00		
		Draft 2000 System Monitoring Report Treatment System Coal Storage Yard	Jan-01		
		Draft Groundwater Protection Report Coal Storage yard	Apr-01		
		Final Aug 00 Groundwater Sampling Report, OU4, Dowl/Ogden Joint Venture, Sep-01	Sep-01		
		Final 2000 System Monitoring Report Treatment System Coal Storage Shed	Oct-01		
		Final Mon well replace report fwa jan 2002	Jan-02		
		OU4 CSY Draft Groundwater Protection Report, FWA AK, April 2002	Apr-02		
		Final 2004 Fall Sampling Report Groundwater Monitoring and Data Analysis at the Landfill Source Area dated May 2004	May-04		
		Draft 2004 Spring Sampling Report, Groundwater Monitoring and Data Analysis at the Landfill Source Area dated Sept 2004	Sep-04		
		Draft 2004 Fall Sampling Report, Groundwater Monitoring at Landfill, OU4 dated January 2005	Jan-05		
		Draft 2005 Annual Sampling Report, Groundwater, Landfill Source Area			
4		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		1997 Groundwater Sampling, Final Report, Landfill Monitoring Wells, DOWL/Ogden	Feb-98		
		November 1997 Groundwater Sampling Final Report: ROD RAD Study, DOWL/Ogden	Apr-98		
		Final Sampling Report, Sep 97-May 98, DOWL/Ogden	Aug-98		
		Technical Memorandum: Landfill Cap Sampling, COE	Aug-98		
		Memorandum, Fort Wainwright Landfill Cap Project Post-Construction Insp., DOWL/Ogden	Sep-98		
		Final Sampling Report (Nested Wells), DOWL/Ogden	Sep-98		
		Final Landfill Monitoring Wells, Sep 98, Groundwater Sampling Report, DOWL/Ogden	Sep-98		
		Groundwater Sampling Report, Final Report, May 99, ROD RADS, DOWL/Ogden	Oct-98		
		Final Dec 98 Groundwater Sampling Report, Landfill, DOWL/Ogden	Dec-98		
		Groundwater Sampling Report, ROD RADS, July 99 CSY	May-99		
		March/June 99 Groundwater Sampling Report, Landfill Monitoring Wells, DOWL/Ogden	Jul-99		
		Technical Memorandum: Landfill Post-Construction Inspection, DOWL/Ogden	Jul-99		
		Landfill Cap Inspection Report, DOWL/Ogden	Jul-99		
		Groundwater Sampling Report, Draft, Landfill Monitoring Wells, DOWL/Ogden	Mar-00		
		August 99 Groundwater Sampling Report, Landfill, Final, DOWL/Ogden	Aug-00		
		March 2000 Groundwater Sampling Report, Landfill Monitoring Wells, DOWL/Ogden	Dec-00		
		Coal Storage yard, Raw Data Report, OU4, ASCI/NANA, Jan-01	Jan-01		
	x	CSY Draft 2000 Annual Monitoring Report, DOWL	Jan-01		
		Corrected Table 1, OU4 Raw Data rt for landfill at FWA dated April 2001	Apr-01		
		OU4 Raw Data Report for Landfill at FWA Apr 01	Apr-01		
		OU4 raw data report for g/w sampling at the CSY, June 2001	Jun-01		
		August 00 Groundwater Sampling Report, Landfill, Final, DOWL/Ogden	Sep-01		
		OU4 Landfill Sep 2001 raw monitoring data, FWA, Nov 2001	Nov-01		
		Fall 2001 Groundwater Raw Data Report Landfill	Nov-01		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		OU4 Coal Storage Yard Fall 2001 Raw Monitoring Data, FWA, Dec 2001	Dec-01		
		Coal Storage Yard Fall 2001 Raw Soil Sampling Data, OU4, ASCI/NANA/Dowl, Dec-01	Dec-01		
		OU4 Landfill Groundwater Sampling Chemical Data Quality Review	Dec-01		
		Chemical Data Quality Assessment Report Landfill 2001 Groundwater Sampling	Feb-02		
		2001 Annual Groundwater Sampling Report Landfill Draft	May-02		
		Draft Groundwater Monitoring and Data Analysis at the Landfill Source Area Work Plan	Jun-02		
		Raw Data Report Coal Storage Yard Soil Sampling	Aug-02		
		CSY Spring 2002 Raw Data Report , OU4, ASCI/NANA, September-02	Sep-02		
		Sampling Data Report for Groundwater Sampling at the Landfill	Sep-02		
		Chemical Data Quality Review Spring 2002 Landfill Monitoring	Sep-02		
		Field Notes for gw and soil sampling at Landfill and CSY Sept/October 2002	Oct-02		
		Sampling Data Report: Fall Sampling at OU4 Landfill December 2002	Dec-02		
		CLOSES Evaluation Coal Storage Yard	Jan-03		
		Draft Annual Report 2002 Landfill	Apr-03		
		Field Notes for gw sampling at CSY, dated May 2003	May-03		
		Sampling Data Report: Spring 2003 CSY, dated July 2003	Jul-03		
		Sampling Data Report: Spring 2003 Landfill, dated July 2003	Jul-03		
		Sampling Data Report Fall 2003, Landfill, dated November 2003	Nov-03		
		Sampling Data Report Fall 2003, OU4 Coal Storage Yard, dated November 2003	Nov-03		
		Well Decommissioning Letter Report for CSY, OU4 dated Dec 2003	Dec-03		
		Well Repair Letter Report for Landfill, OU4 dated Dec 2003	Dec-03		
		CDQR Fall 2003 GW Monitoring at the CSY, OU4 dated Dec 2003	Dec-03		
		CDQR Fall 2003 GW Monitoring at the Landfill, OU4 dated Dec 2003	Dec-03		
		Technical Memorandum: Coal Storage Yard Remediation System Decommissioning, dated August 2004	Aug-04		
		CSY Spring 2002 Raw Data Report	Spring 2002		
		Tech Memo 2005 Spring Sampling Results groundwater monitoring			
		Draft August 2000 Groundwater Sampling Report for Landfill Monitoring Wells			Confirm date of issuance
5	x	OU5 ROD	Mar-99	One-time plus amendments	
5		Feasibility Studies		Once	
		OU5 Feasibility Study, HLA	Nov-97		
		Final OU 5 Feasibility Study, CH2MHill	Jun-98		
		Final Six-Phase Soil Heating/Column Study Treatability Study Work Plan, CH2MHill	Aug-99		
		Vertical Air Sparging Curtain/Feasibility Study, WQFS, CH2MHill	Jul-00		
		Final Column Study Report, WQFS 1, CH2MHill	Sep-00		
		Intrinsic Remediation Evaluation, EQFS, CH2MHill	Nov-00		
		WQFS Six-Phase Soil Heating/Column Study TS Work Plan, Comments on Draft, CH2MHill	Mar-01		
5		Remedial Design		Once	
		Remedial Investigation Report OU5	Nov-96		
		Proposed Plan for Remedial Action at OU 5, CH2MHill	Jun-98		
		WQFS3 RA WP Final FWA Apr 2000	Apr-00		
		Bldg 1060 west, RAWP OU5, FWA Apr 2000	Apr-00		
		Final PAH eval WP, WQFS2, FWA, May 00	May-00		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Final TM SS&HP, WQFS3 & 1060 W, Aug 00	Aug-00		
		Preliminary draft RA WP, WQFS2, FWA, Aug 00	Aug-00		
		WQFS1B Preliminary Draft Remedial Action Work Plan, ENSR	Jan-01		
		WQFS Subarea 2, Draft PAH Evaluation Report	Feb-01		
		OU5WQFS3, Final SVE/AS RA WP April 2001	Apr-01		
		Oxidizer Cost/Benefit Analysis Report for OU3, OU5 and other areas at Ft. Wainwright Ak	Apr-01		also in OU3
		OU5 1060W, final SVE/AS RA WP April 2001	Apr-01		
		Source Area Remedial Action Work Plan May 2001	May-01		
		Revised Site Safety & Health Plan, OU5, Northwind, May-01	May-01		
		Draft work plan, 2002 CRAPP, FWA Dec 2001	Dec-01		
		Groundwater Contaminant Data Collection and Trend Analysis Work Plan	Jun-02		
		EQFS Monitored Natural Attenuation Sampling Plan	Oct-02		
		AS/SVE OM&M Project Schedule OU5, Northwind, Nov-02	Nov-02		
		FINAL OU5 Quality Assurance Program Plan , Northwind, Jun-03	Jun-03		
		Final Horizontal Well Remediation System Air Sparge Probe Redevelopment Monitoring Work Plan, dated Aug 2003	Aug-03		
		EQFS Monitored Natural Attenuation Long Term Monitoring Plan	Jul-04		
		Draft Technical Memorandum and QAPP, EQFS OU5 FWA dated June 2005	Jun-05		
		Site Specific Safety and health Plan	Jun-05		
		Birch Hill Lead Investigation Work Plan Remedial Area 1A	Sep-05		
		WQFS Subarea 3 Final SVE/AS RA Work Plan, North Wind	NA		
		Building 1060 West, Remedial Action Work Plan, CH2MHill	NA		
		EQFS Intrinsic Remediatin Evaluation, CH2MHill	NA		
		Addendum to final work plan, Chena River Aquatic Asmt			
		Draft WQFS3, RA WP, OU5, FWA, AK			
		Draft EQFS Monitored Natural Attenuation Long-Term Monitoring Plan, OU5			
		Final Birch Hill Lead Investigation Work Plan, Remedial Area 1A			
5		Aquatic Assessment		Ongoing	
	x	Chena River Aquatic Assessment Program, 1997-98, Vol I & II, ABR/CH2MHill	Mar-99		
	x	Chena River Aquatic Assessment Program, Spring and Summer, ABR	Sep-99		
		1998 and 1999 Chena River Surface Water Sampling Technical Memo, WQFS2, CH2MHill	Dec-99		
		1998 and 1999 Chena River Surface Water Sampling Technical Memo, WQFS2, CH2MHill			Confirm date of issuance
		Chena River Assessment Program, OU5, ABR/CH2MHill			Confirm date of issuance
	x	Technical Memorandum: Chena River Aquatic Assessment Program, Interim Report, CH2MHill	Dec-99		
		1998-99 Chena River Surface Water Sampling Tech Memo, CH2M Hill			
		Chena River Aquatic Assessment Program, ABR/CH2M Hill			
		Final 2002 Sediment Quality Monitoring Program, Chena River Aqua Asmt Prog, FWA, CH2M Hill, Apr-03	Apr-03		
		Final Work Plan for the 2002 Chena River Aquatic Assessment Program, FWA AK, CH2M Hill, Apr-02	Apr-02		
5		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		SPSH& RFH Draft final report WQFS/OU5, FWA Jan 00	Jan-00		
		Annual Air Sparging Curtain/Source Area monitoring Report, WQFS1 and 2, OU5, CH2M Hill, Mar-00	Mar-00		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Anl Mon Rpt Hwell, TS OU5 FWA/FRA March 2000	Mar-00		
		Building 1060 West, Remedial Action Work Plan, CH2M Hill, Apr-00	Apr-00		
		Building 1060W, Remedial Action Work Plan, CH2M Hill, Apr-00	Apr-00		
		WQFS Remedial Action Work Plan, Final, CH2M Hill, Apr-00	Apr-00		
		Bldg 1060TS Annual Rpt, Yr 5, FWA AK May 2000	May-00		
		Verticle Sparging Curtain TS WQFS2 Semi Anl Mon Rpt Yr 2 July 00	Jul-00		
		Final Column Study Report, WQFS1, Operable Unit 5, CH2M Hill, Sep-00	Sep-00		
		Draft Decom RA Sys at Bldg 1060 & 3562 & Draft SSHP Sep 00	Sep-00		
		Final Tech Memo Site Safety & Health Plan, WQFS3 & 1060W, Northwind, Aug-00 Final, Column Study Report, WQFS1, CH2M Hill, Sep-00	Sep-00		
		Chemical Data Report, WQFS, OU5, Alaska District Corps of Engineers, Oct-00	Oct-00		
		Final Work Plan for Decommissioning Remediation Systems at Bldgs 1060 East & 3562, Final Site Safety and Health Plan, ASCI/NANA, Oct-00	Oct-00		
		Intrinsic Remediation Evaluation EQFS FWA AK Nov 00	Nov-00		
		Memo: After Action Report, Soil Heating Treatability Study Soil Borings, CH2M Hill, Nov-00	Nov-00		
		RAR for decom ts at Bldgs 1060 and 3562, FWA, Nov 2000	Nov-00		
		Remedial Action Report for Decommissioning Remediation Systems at Bldgs 1060 East and 3562, ASCI/NANA, Nov-00	Nov-00		
		Final Construction report for WQFS3/1060W rem sys at fwa apr 01	Jan-01		
		AS Curtain & Source Area TS 99 Anl Rpt OU5 FWA AK Jan 01	Jan-01		
		Draft PAH Eval Report WQFS Subarea 2 Feb 2001	Feb-01		
		OU5 Horiz Well Tmt Sys Final 2000 Annual Mon Rprt March 2001	Mar-01		
		Draft 2000 PDRAR Apr 01	Apr-01		
		Draft AS Crutain & Source Area TS 2000 Annual Rpt Apr 01	Apr-01		
		SP heating & RF heating TS final report, WQFS, OU5, FWA, April 2001	Apr-01		
		1060W, Final Soil Vapor Extraction/Air Sparging Remedial Action Work Plan, Northwind, Apr-01	Apr-01		
		Construction Report for WQFS3/1060W, Remedial Systems, Northwind, Apr-01	Apr-01		
		Six Phase Soil Heating and Radio Frequency Heating, Treatability Study Final Report, WQFS, CH2M Hill, Apr-01	Apr-01		
		WQFS3, Final Soil Vapor Extraction/Air Sparging Remedial Action Work Plan, Northwind, Apr-01	Apr-01		
	x	Draft 2000 Preliminary Draft Remedial Action Report	Apr-01		
		OU5 WQFS2 Vertical Sparging Curtain TS Year 3 semi-annual rpt, May 2001	May-01		
		Final Design Drawings for Treatment System at WQFS1A, ENSR/Voom/CH2M Hill, May-01	May-01		
		Final Tech Memo for Construction Activities at WQFS1A, 1C&2, Northwind, May-01	May-01		
		Final WP for Decon Red Sysm @1060 & 3562, FWA 10/00&Final SSHP	Nov-01		
		OU5 Air Sparge Curtain and Source Area Treatability Study 2000 Annual Report, CH2M Hill, Dec-01	Dec-01		
		OU5 AS Curtain & SA treatabilities studies 00 annual rpt fwa dec 2001	Dec-01		
		Mid-Year TM for Bldg 1060W & WQFS3 Rem Sysm, OU5, FWA Dec 2001	Dec-01		
		Draft 01 annual report, ou5 source area TS, fwa AKJan 02	Jan-02		
		OU5, WQFS, PAH Evaluation Report, FWA, CH2M Hill, Apr-02	Apr-02		
		West Quartermaster's Fueling System Subarea 3, Bldg 1060 West Remediation Systems 2001 Annual Report	Jun-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Post Construction Report WQFS1 and WQFS2 Remediation System Modifications	Jun-02		
		2002 Interim Remedial Action Report September 2002	Sep-02		
		Source Area Treatability Study, 2001 Annual Report, OU5, CH2M Hill, Dec-02	Dec-02		
		Final Sparge Curtain Source Area Horizontal Well Air Sparge/Soil Vapor Extraction Treatment Systems	Jan-03		
		Draft CLOSES Evaluation WQFS OU5	Feb-03		
		OU5 WQFS CLOSES Evaluation , CH2M Hill, May-03	May-03		
		Draft OU5 Annual Report, March 2002-February 2003, dated September 2003	Sep-03		
		Final OU5 Annual Report March 2002 to Feb 2003 FWA dated February 2005	Feb-05		
		Birch Hill Lead Investigation Draft Report Area 1A	Dec-05		
		Draft Annual Report July 2004 to July 2005	Jan-06		
		Draft EQFS Monitored Natural Attenuation Sampling Fall 2005 Report	Feb-06		
		Final Annual Report March 2003 to June 2004 OU5	Feb-06		
		TM, CRAAP, OU5, FWA, Interim Report			
		CRAAP OU5 FWA			
		Draft Birch Hill Lead Investigation Report, Remedial 1A, FWA			
		Final Source Area Treatability Study, 2001 Annual Report			
		Approach to Estimating Cleanup Times, WQFS, CH2M Hill			
		Birch Hill UST Site Draft Remedial Investigation, Ecology and Environment			
		Mid-Year Tech Memo for Bldgs 1060W & WQFS3 Remedial Systems, Northwind, Dec			
5		Drawing/ as-builts		See RD and PDRARs	
		Drawings, Planned Remedial Action Augmentation, WQFS1A, ENSR/VOOM/CH2MHill	Jun-05		
		Operable Unit 5, WQFS1C Remedial Action Design Drawings, ENSR/Voom/CH2M Hill, Nov-00	Nov-00		
		Design Drawings, Operable Unit 5, WQFS1A Remedial Action, ENSR/Voom/CH2M Hill, Dec-00	Dec-00		
		Operable Unit 5, WQFS1B, Remedial Action Design Drawings, ENSR/Voom/CH2M Hill, Jan-01	Jan-01		
		OU5 Final Design Drawing for Treatment System at WQFS1A, FWA May 2001	May-01		
		OU5 Final Remedial Action Design Drawings for WQFS2&WQFS1C, June 2001	Jun-01		
		Drawings/RAWP tests			
5		O&M Manuals and Reports		Once	
		Draft OM&M Manual for WQFS3 Rem Sysm, March 2001	Mar-01		
		Final Bldg 1060W rem sys op, main & mon manual, OU5, Nov 2001	Nov-01		
		Final Source Area Remediation System Operation, Maintenance, and Monitoring Manual	Nov-05		
		Final Sparge Curtain Remediation System Operation, Maintenance, and Monitoring Manual	Nov-05		
		Final Horizontal Well Remediation System Operation, Maintenance, and Monitoring Manual	Nov-05		
5		GW, SW, and air monitoring plans & reports		Annual	
		Draft Final 1999 G/W Sampling WQFS FWA AKJun 2000	Jun-00		
		Radio Frequency Heating/Six Phase Soil Heating Treatability Study Ntrient Addition Work Plan Addendum., CH2M Hill, Jul-00	Jul-00		
		Air Sparging Curtain and Source Area Treatability Study, 1999 Annual Report, CH2M Hill, Jan-01	Jan-01		
		Horizontal Well Treatment System Final 2000 Annual Monitoring, Hart Crowser, Mar-01	Mar-01		
		Draft 00 WQFS nutrient amendment, g/w sampling & summary report, April 2001	Apr-01		
		WQFS2 Vertical Air Sparging Curtain Treatability Study Year 3, Semi-Annual Report, CH2M Hill, May-01	May-01		
		Project Schedule for Horizontal Well Optimization, Indoor Air @ 1060, Updated QAPP, Northwind, Jun-02	Jun-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		WQFS Sub-Area 3 & Bldg 1060W Remediation Systems 2001 Annual Report, Northwind, Jun-02	Jun-02		
		Indoor Air Monitoring, Building 1060W, Northwind, Aug-02	Aug-02		
		Groundwater Contaminant Data Colllection Work Plan	Oct-02		
		FINAL Sparge Curtain Source Area & Horizontal Well Remediation System 2001 Annual Rpt, Northwind, Jan-03	Jan-03		
		Horizontal Well Remediation System AS Probe Monitoring Report, OU5 FWA dated February 2004	Feb-04		
		Final Technical Memorandum Results of Indoor Air Monitoring at Building 1060 dated March 2004	Mar-04		
		Draft EQFS Monitored Natural Attenuation Sampling Fall 05 Report	Fall 2005		
5		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		Technical Memorandum: OU 5 Feasibility Study Groundwater Monitoring Results, CH2MHill	Oct-97		
		Monitoring Well Survey and Groundwater Modeling, ENSR	Feb-99		
		Installation Report, Source Area Treatability Study, CH2MHill	Feb-99		
		Quarterly Monitoring Report, OU 5 Treatability Study, Horizontal Well, Hart Crowser	Feb-99		
		Quarterly Monitoring Report, 1 Dec 98-3 Mar 99,Treatability Study, Hart Crowser	Apr-99		
		Bldg 1060 Treatability Study Annual Report Year 4, Jan 98-Dec 98, CH2MHill	May-99		
		Source Area TS WQFS Semiannual Monitoring Report, CH2MHill	Jul-99		
		Quarterly Monitoring Report, Horizontal Well/Driven Progress, WQFS1, Hart Crowser	Sep-99		
		Chemical Data Report, COE Geotechnical Branch	Oct-99		
		TM: Evaluating Remedial Operations for Implementation at OU5, CH2MHill	Oct-99		
		Semi-Annual Monitoring Report, Vertical Air Sparging Curtain, WQFS2, CH2MHill	Dec-99		
		Annual Monitoring Report, Horizontal Wells, Hart Crowser	Mar-00		
		Annual Air Sparging Curtain/Source Area Monitoring Report,WQFS1 and 2, CH2MHill	Mar-00		
		Annual Monitoring Report, Horizontal Wells, Hart Crowser, Mar-00	Mar-00		
		Soil Borings & Groundwater Monitoring Well Logs, Spring 2000 Field Activities, Bldgs. 2062 and OU5, Alaska District Corps of Engineers, Apr-00	Apr-00		
		March 30, 2000 Groundwater Sampling Results, Bldg 2063 and Apple Road, COE	Apr-00		
		Time to Cleanup Tool: Spreadsheet Documentation, OU5 and FWA, CH2MHill	May-00		
		Bldg 1060 Treatability Study Annual Report Year 5, CH2MHill	May-00		
		Soil Borings and Groundwater Monitoring Well Logs, Field Activities at Bldgs 2063 and Operable Unit 5 (Apple Road), Alaska District Corps of Engineers, Jun-00	Jun-00		
		In Situ A/S Tmt Efficienty Tracer Tseting 6 Jun 00	Jun-00		
		(email) RFH/SPSH TS Nutrient Add WP Addendum Jun 00	Jun-00		
		In Situ Air Sparging Treatment Efficiency Tracer Testing, CH2MHill	Jun-00		
		PAH Evaluation Work Plan, WQFS2, CH2M Hill, Jun-00	Jun-00		
		OU5 Final Chem Rpt for Mon Well inst & Samp Apple Rd, FWA, July 2000	Jul-00		
		20 Well Ground Water Field Sampling Plan Summer 2000	Jul-00		
		Memorandum from ABR on 11 Sep 00 T/C CRAAP	Sep-00		
		Chemical Data Report, WQFS, COE	Oct-00		
		After Action Report: Bldg 3564 and Soil Heating TS Soil Borings, CH2MHill	Nov-00		
		Final 1999 Groundwater Sampling, WQFS, CH2MHill	Dec-00		
		Final 1999 Groundwater Sampling, WQFS, CH2M Hill, Dec-00	Dec-00		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2006 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Air Sparging Curtain and Source Area Treatability Study, 1999 Annual Report, CH2MHill	Jan-01		
		Tech Memo: Apple Street Groundwater Investigation, OU5, Northwind, Feb-01	Feb-01		
		Final Spring 1999 Groundwater Sampling, EQFS, CH2MHill	Feb-01		
		Apple Street Groundwater Investigation Tech Memo	Feb-01		
		Final Spring 1999 Groundwater Sampling, EQFS, CH2M Hill, Feb-01	Feb-01		
		Groundwater modeling at FWA, Apr 01	Apr-01		
		OU5 Final Tech Memo for Construction Acivities at WQFS1A,1C & 2, May 2001	May-01		
		Revised spider diagrams, May 01 EQFS G/W Sampling Program	May-01		
		EQFS G/W Monitoring Well Sasmpling Program Summary & Spider Dia 9/01	Sep-01		
		TM Well decommissiong at OU5 Oct 2001	Oct-01		
		rev spider diagrams EQFS g/w sampling from May 2001, Nov 2001	Nov-01		
		OU5 WQFS Nutrient Amendment G/W Sampling & Summare rpt for 00, dec 01	Dec-01		
		2000 WQFS Nutrient Amendment Groundwater Sampling and Summary Report	Dec-01		
		WQFS Nutrient Amendment Groundwater Sampling and Summary Report for 2000, CH2M Hill, Dec-01	Dec-01		
		OU5 Air Sparging Curtain Treatability Study Analytical Data, FWA AK April 2002	Apr-02		
		OU5 Source Area Treatability Study Analytical Data, FWA AK, April 2002	Apr-02		
		Draft Tech Memo - Results of Indoor Air Monitoring at Building 1060 dated December 2003	Dec-03		
		Technical Memorandum Indoor Air Monitoring at Bldg 5010 dated October 2004	Oct-04		
		Monitored Natural Attenuation Sampling EQFS dated May 2005	May-05		
		Horizontal Well Treatability Study Annual Monitoring Report, Hart Crowser	Jun-05		
		Final Technical Memorandum Monitored Natural Attenuation Sampling East Quartermaster's Fueling Station	Sep-05		
		Soil Borings and Groundwater Monitoring Well Logs, Spring 2000, Bldg 2063 and OU5, COE	Spring 00		
		Semi Annual Monitoring Report, Vertical Air Sparging Curtain, WQFS, CH2M Hill			
		Approach Memo for H Well Maint WQFS3			
		Draft EQFS October 2002 Groundwater Results			
		Final Technical Memo, Monitored Natural Attenuation Sampling			
		TM: AAR, STS; AAR: 3564 soil borings; AAR Soil Htg TS Soil borings			
		Approach to Estimating Cleanup Times, WQFS, CH2MHill			Confirm date of issuance
		Semi-Annual Monitoring Report, Vertical Air Sparging Curtain, WQFS2, CH2MHill			Confirm date of issuance
		Horizontal Well Treatment System Final 2000 Annual Monitoring Report			Confirm date of issuance

Appendix B

Appendix B

Summary of Numeric Cleanup Goals for Each Operable Unit

Summary of Numeric Cleanup Goals for Each Operable Unit[1]

OU	Source Area	Medium	Contaminant of Concern	Cleanup Goal	Units	Basis
1	Drum Burial Site	Groundwater	1,1-Dichloroethene	7	ug/L	MCL
			Benzene	5	ug/L	MCL
			Vinyl chloride	2	ug/L	MCL
			Aldrin[2]	0.004	ug/L	RBC
			Dieldrin[2]	0.004	ug/L	RBC
		Soil	Aldrin[3]	3.8	mg/kg	RBC
			Dieldrin[3]	4.0	mg/kg	RBC
2	DRMO Yard	Groundwater	Benzene	5	ug/L	MCL
			Tetrachloroethene	5	ug/L	MCL
			Trichloroethene	5	ug/L	MCL
			Vinyl chloride	2	ug/L	MCL
			1,1-Dichloroethene	7	ug/L	MCL
			cis-1,2-Dichloroethene	70	ug/L	MCL
	Bldg 1168 Leach Well	Groundwater	Benzene	5	ug/L	MCL
			Trichloroethene	5	ug/L	MCL
			Vinyl chloride	2	ug/L	MCL
			1,1-Dichloroethene	7	ug/L	MCL
			cis-1,2-Dichloroethene	70	ug/L	MCL
3	All	Groundwater	Benzene	5	ug/L	MCL
			Toluene	1000	ug/L	MCL
			Ethylbenzene	700	ug/L	MCL
			1,2-Dibromoethane	0.05	ug/L	MCL
			1,2-Dichloroethane	5	ug/L	MCL
			1,2,4-Trimethyl benzene[4]	1.85	mg/L	RBC
			1,3,5-Trimethyl benzene[4]	1.85	mg/L	RBC
4	Landfill	Groundwater	Benzene	5	ug/L	MCL
			cis-1,2-Dichloroethene	70	ug/L	MCL
			1,1,2,2-Tetrachloroethane[2]	5.2	ug/L	RBC
			1,1,2-Trichloroethane	5	ug/L	MCL
			Trichloroethene	5	ug/L	MCL
			Vinyl chloride	2	ug/L	MCL
			Bis(2-Ethylhexyl)phthalate	6	ug/L	MCL
	Coal Storage Yard	Groundwater	Benzene	5	ug/L	MCL
			Bis(2-Ethylhexyl)phthalate	6	ug/L	MCL
			Trichloroethene	5	ug/L	MCL
			Toluene	1000	ug/L	MCL
5	WQFS	Groundwater	1,2-Dichloroethane	5	ug/L	MCL
			Benzene	5	ug/L	MCL
			Toluene	1000	ug/L	MCL
	EQFS	Groundwater	1,2-Dichloroethane	5	ug/L	MCL
			Toluene	1000	ug/L	MCL
			Trichloroethene	5	ug/L	MCL
			1,2-Dibromoethane	0.05	ug/L	MCL
			bis(2-Chloroethyl) ether[2]	0.0092	ug/L	RBC
	Chena River Surface Water	Surface Water	TAH[5]	10	ug/L	CWA & AWQS
			TAqH[5]	15	ug/L	CWA & AWQS

[1] Table summarizes goals for CERCLA contaminants. State of Alaska cleanup levels for petroleum hydrocarbon contamination are discussed in the RODs and the Federal Facility Agreement.
[2] These contaminants now have State of Alaska MCLs in 18 AAC 75 Table C; cleanup levels from ROD are listed in table.
[3] These contaminants now have State of Alaska soil cleanup levels in 18 AAC 75 Table B1; cleanup levels from ROD are listed in table.
[4] Cleanup levels for Trimethylbenzene were changed in the OU3 ESD; the new levels are listed in the table and are calculated based on residential exposure parameters and toxicity data from EPAs IRIS database (also from the State of Alaska Tech. Memo 01-007 Additional Cleanup Values, AK DEC, Nov 24, 2003).
[5] TAH and TAqH may change to lower levels in the future. Reference Alaska Water Quality Standards 2003-2006 Triennial Review

Appendix C

Appendix C

Photographic Log and Site Inspection Check Lists

Photograph 1 – View of Phytoremediation Cell Adjacent Fort Wainwright Landfill, Operable Unit 1

Photograph 2 – Phytoremediation Cell Showing Concrete Berm (flag indicates vent location), Operable Unit 1

Photograph 3 – Vent Installation, Phytoremediation Cell
Operable Unit 1

Photograph 4 – Completed Vent Location, Phytoremediation Cell
Operable Unit 1

Photograph 5 – Interpretive Display, 801 Drum Site
Operable Unit 1

Photograph 6 – 801 Drum Site Area
Operable Unit 1

Photograph 7 – DRMO1 3-Party Treatment System Taken from DRMO Yard
Operable Unit 2

Photograph 8 – DRMO1 2-Party Treatment System
Operable Unit 2

Photograph 9 – Former Building 1168 Area Showing Construction Activity (Monitoring Well AP-6809 in Foreground), Operable Unit 2

Photograph 10 – Monitoring Wells AP-5789 & AP-5790 Downgradient from Former Building 1168 Area, Operable Unit 2

Photograph 11 – View Looking Up at the Birch Hill Tank Farm
Operable Unit 3

Photograph 12 – View Looking Down from Birch Hill Tank Farm
Operable Unit 3

Photograph 13 – Building 1182 (Former Pump House that Contains Product Recovery Equipment), Operable Unit 3

Photograph 14 – Truck Fill Stand and Thaw Channel Treatment System, Operable Unit 3

Photograph 15 – Post Fence Line along Thaw Channel Area (New Housing Development Construction in Background), Operable Unit 3

Photograph 16 – Interpretive Display, ROLF Area (Former Building 1144 Treatment System in Background), Operable Unit 3

Photograph 17 – Eight Car Header Upgradient Area Treatment System
Operable Unit 3

Photograph 18 – Central Header Treatment System
Operable Unit 3

Photograph 19 – Milepost 3.0 Area
Operable Unit 3

Photograph 20 – Typical Frostjacking of Monitoring Well at Milepost 2.7 & 3.0 Areas
Operable Unit 3

Photograph 21 – Monitoring Well FWLF-4 in Foreground (Interpretive Display for Closed Portion of the Fort Wainwright Landfill in Background), Operable Unit 4

Photograph 22 – Monitoring Well AP-6132 (Upgradient from Landfill) Operable Unit 4

Photograph 23 – Sparge Curtain Treatment System
Operable Unit 5

Photograph 24 – Monitoring Locations for Sparge Curtain Treatment System (Chena River is Visible in Background), Operable Unit 5

Photograph 25 – Source Area Treatment System (Horizontal Well Treatment System Visible In Background), Operable Unit 5

Photograph 26 – Thermal/Catalytic Oxidizer, Source Area Treatment System Operable Unit 5

Photograph 27 – Interior of Monitoring Enclosure
Operable Unit 5

Photograph 28 – Building 1060W Treatment System
Operable Unit 5

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: 801 Drum Burial Site **Date of inspection:** June 6, 2006

Site Location: Fort Wainwright, Alaska **Operable Unit** OU1 **X Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army Environmental Center

Weather/temperature: Partly cloudy, mild temperatures

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Other ____________________

X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	X N/A
As-built drawings	☐ Readily available	☐ Up to date	X N/A
Maintenance logs	☐ Readily available	☐ Up to date	X N/A

Remarks____

Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	X N/A
Contingency Plan/Emergency Response Plan	☐ Readily available	☐ Up to date	X N/A

Remarks____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	X N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	X N/A
Effluent discharge	☐ Readily available	☐ Up to date	X N/A
Groundwater Monitoring Records	☐ Readily available	☐ Up to date	X N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	X N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged ☐ Gates secured **X** N/A
Signs and other security measures **X** In place ☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy **X** ICs are adequate ☐ ICs are inadequate ☐ N/A

Vandalism/trespassing evident ☐ Yes **X** No ☐ N/A

Land use changes on site ☐ Yes **X** No ☐ N/A

GENERAL SITE CONDITIONS
Roads ☐ Damaged **X** Adequate ☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐ Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: DRMO Yard **Date of inspection:** June 6, 2006

Site Location: Fort Wainwright, Alaska **Operable Unit** OU2 **X Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army Environmental Center

Weather/temperature: Partly cloudy, mild temperatures

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- X Access controls
- X Institutional controls
- ☐ Groundwater pump and treatment
- X Other: Air Sparge / Soil Vapor Extraction
- X Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	X Readily available	☐ Up to date	☐ N/A
As-built drawings	X Readily available	☐ Up to date	☐ N/A
Maintenance logs	X Readily available	☐ Up to date	☐ N/A

Remarks____________________

Site-Specific Health and Safety Plan	X Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	X Readily available	☐ Up to date	☐ N/A

Remarks____________________

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	X N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	X N/A
Effluent discharge	☐ Readily available	☐ Up to date	X N/A
Groundwater Monitoring Records	☐ Readily available	X Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	X N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged X Gates secured ☐ N/A
Signs and other security measures X In place ☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	X No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	X No	☐ N/A

Adequacy X ICs are adequate ☐ ICs are inadequate ☐ N/A

Vandalism/trespassing evident ☐ Yes X No ☐ N/A

Land use changes on site ☐ Yes X No ☐ N/A

GENERAL SITE CONDITIONS
Roads ☐ Damaged X Adequate ☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition X All required wells properly operating ☐ Needs Maintenance ☐ N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance X N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked X Functioning X Routinely sampled X Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: Birch Hill Tank Farm (Remedial Area 1b) **Date of inspection:** June 6, 2006

Site Location: Fort Wainwright, Alaska **Operable Unit** OU3 **X Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army Environmental Center

Weather/temperature: Partly cloudy, mild temperatures

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
X Other: Air Sparge / Soil Vapor Extraction
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	X Readily available	☐ Up to date	☐ N/A
As-built drawings	X Readily available	☐ Up to date	☐ N/A
Maintenance logs	X Readily available	☐ Up to date	☐ N/A

Remarks____

Site-Specific Health and Safety Plan	X Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	X Readily available	☐ Up to date	☐ N/A

Remarks____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	X N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	X N/A
Effluent discharge	☐ Readily available	☐ Up to date	X N/A
Groundwater Monitoring Records	☐ Readily available	X Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	X N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged X Gates secured ☐ N/A
Signs and other security measures X In place ☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes X No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes X No ☐ N/A

Adequacy X ICs are adequate ☐ ICs are inadequate ☐ N/A

Vandalism/trespassing evident ☐ Yes X No ☐ N/A

Land use changes on site ☐ Yes X No ☐ N/A

GENERAL SITE CONDITIONS
Roads ☐ Damaged X Adequate ☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical

☐ Good condition X All required wells properly operating ☐ Needs Maintenance ☐ N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance X N/A

Monitoring Data

X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)

X Properly secured/locked X Functioning X Routinely sampled X Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: Railcar Off-Loading Facility (RA 2) **Date of inspection:** June 6, 2006

Site Location: Fort Wainwright, Alaska **Operable Unit** OU3 **X Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army Environmental Center

Weather/temperature: Partly cloudy, mild temperatures

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- **X** Access controls
- **X** Institutional controls
- ☐ Groundwater pump and treatment
- **X** Other: Air Sparge / Soil Vapor Extraction
- **X** Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	X Readily available	☐ Up to date	☐ N/A
As-built drawings	X Readily available	☐ Up to date	☐ N/A
Maintenance logs	X Readily available	☐ Up to date	☐ N/A

Remarks____

Site-Specific Health and Safety Plan	X Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	X Readily available	☐ Up to date	☐ N/A

Remarks____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	X N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	X N/A
Effluent discharge	☐ Readily available	☐ Up to date	X N/A
Groundwater Monitoring Records	☐ Readily available	X Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	X N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged X Gates secured ☐ N/A
Signs and other security measures X In place ☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	X No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	X No	☐ N/A

Adequacy X ICs are adequate ☐ ICs are inadequate ☐ N/A

Vandalism/trespassing evident ☐ Yes X No ☐ N/A

Land use changes on site ☐ Yes X No ☐ N/A

GENERAL SITE CONDITIONS
Roads ☐ Damaged X Adequate ☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition X All required wells properly operating ☐ Needs Maintenance ☐ N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance X N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked X Functioning X Routinely sampled X Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: MP 2.7 and 3.0 **Date of inspection:** June 6, 2006

Site Location: Fort Wainwright, Alaska **Operable Unit** OU3 **X Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army Environmental Center

Weather/temperature: Partly cloudy, mild temperatures

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment	X Monitored natural attenuation
☐ Access controls	☐ Groundwater containment
X Institutional controls	☐ Vertical barrier walls
☐ Groundwater pump and treatment	☐ Surface water collection and treatment
☐ Other ______________	

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	X N/A
As-built drawings	☐ Readily available	☐ Up to date	X N/A
Maintenance logs	☐ Readily available	☐ Up to date	X N/A

Remarks______________________________

Site-Specific Health and Safety Plan	X Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	X Readily available	☐ Up to date	☐ N/A

Remarks______________________________

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	X N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	X N/A
Effluent discharge	☐ Readily available	☐ Up to date	X N/A
Groundwater Monitoring Records	☐ Readily available	X Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	X N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	☐ Gates secured	X N/A
Signs and other security measures	☐ In place	X N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	X No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	X No	☐ N/A

Adequacy	X ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	X No	☐ N/A
Land use changes on site	☐ Yes	X No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	X Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance X N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance X N/A

Monitoring Data

X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)

X Properly secured/locked X Functioning X Routinely sampled X Good condition
X All required wells located X Needs Maintenance

Note: A few of the wells were observed to have frost-jacked and may need to be replaced

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: Ft Wainwright Landfill **Date of inspection:** June 6, 2006

Site Location: Fort Wainwright, Alaska **Operable Unit** OU4 **X Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army Environmental Center

Weather/temperature: Partly cloudy, mild temperatures

Remedy Includes: (Check all that apply)

X Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Other ____________

X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	X N/A
As-built drawings	☐ Readily available	☐ Up to date	X N/A
Maintenance logs	☐ Readily available	☐ Up to date	X N/A

Remarks____________

Site-Specific Health and Safety Plan	X Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	X Readily available	☐ Up to date	☐ N/A

Remarks____________

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	X N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	X N/A
Effluent discharge	☐ Readily available	☐ Up to date	X N/A
Groundwater Monitoring Records	X Readily available	☐ Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	X N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	X Gates secured	☐ N/A
Signs and other security measures	X In place	☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	X No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	X No	☐ N/A

Adequacy X ICs are adequate ☐ ICs are inadequate ☐ N/A

Vandalism/trespassing evident ☐ Yes X No ☐ N/A

Land use changes on site ☐ Yes X No ☐ N/A

GENERAL SITE CONDITIONS
Roads ☐ Damaged X Adequate ☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance X N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance X N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked X Functioning X Routinely sampled X Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: <u>EQFS / WQFS / Chena River</u> **Date of inspection:** June 6, 2006

Site Location: <u>Fort Wainwright, Alaska</u> **Operable Unit** <u>OU5</u> **X Site Map Attached**

EPA Region: <u>10</u> **EPA ID:** <u>AK6210022426</u>

Agency, office, or company leading the five-year review: <u>U.S. Army Environmental Center</u>

Weather/temperature: <u>Partly cloudy, mild temperatures</u>

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
X Other: <u>Air Sparge / Soil Vapor Extraction</u>
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	X Readily available	☐ Up to date	☐ N/A
As-built drawings	X Readily available	☐ Up to date	☐ N/A
Maintenance logs	X Readily available	☐ Up to date	☐ N/A

Remarks______________________________

Site-Specific Health and Safety Plan	X Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	X Readily available	☐ Up to date	☐ N/A

Remarks______________________________

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A
Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged ☐ Gates secured **X** N/A

Signs and other security measures **X** In place ☐ N/A

Institutional Controls (ICs)

Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes **X** No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes **X** No ☐ N/A

Adequacy **X** ICs are adequate ☐ ICs are inadequate ☐ N/A

Vandalism/trespassing evident ☐ Yes **X** No ☐ N/A

Land use changes on site ☐ Yes **X** No ☐ N/A

GENERAL SITE CONDITIONS

Roads ☐ Damaged **X** Adequate ☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES

Groundwater Extraction Wells, Pumps, and Pipelines

Pumps, Wellhead Plumbing, and Electrical

☐ Good condition **X** All required wells properly operating ☐ Needs Maintenance ☐ N/A

Surface Water Collection Structures, Pumps, and Pipelines

Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data

X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation

Monitoring Wells (natural attenuation remedy)

X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition

X All required wells located ☐ Needs Maintenance

Appendix D

Appendix D

Fort Wainwright Five-Year Review
Public Repository Status Memorandum

Fort Wainwright Five-Year Review
Public Repository Status Memorandum

Repository Visits

On June 7, 2006, representatives of the U.S. Army Corps of Engineers visited document repositories at the Noel Wien Library (1215 Cowles Street, Fairbanks, Alaska) and the Administrative Record docket at the DPW Environmental Office (Building 3023, Ft Wainwright). The Fort Wainwright Post Library (Building 3700) was not open on that date, but was visited on July 6, 2006 by a representative from FES Inc. The repositories were visited to confirm the availability of documents in the Fort Wainwright NPL Site Administrative Record. This report summarizes the findings of these visits and suggests actions USARAK may take to ensure that complete sets of documents in the Administrative Record are readily available to the public.

Summary of Findings

The following table summarizes the availability of the Administrative Record at each of the three repositories available to the public for this NPL site.

Location	Hard Copy	Microfiche	CDs
Noel Wien Library Contact: Judy Countryman (907) 459-1033	Administrative Record Index Overview of the Installation Restoration Program Records of Decision (RODs) Operable Unit 1 Operable Unit 2 Operable Unit 3 Operable Unit 4 Operable Unit 5	Administrative Record (pages 00001 – 102654) Nothing has been added since the 2001 visit and the file is basically in exactly the same condition as was found in 2001.	Administrative Record, first 9 of 16 CDs (pages 00001 – 78697) Nothing appears to have been added since the 2001 visit
Fort Wainwright Post Library Contact: Betty Luebke (907) 353-3147	Administrative Record Index Informational Repository Records of Decision Operable Unit 1 Operable Unit 2 Operable Unit 3 Operable Unit 4 Operable Unit 5 2001 Five-Year Review	All microfiche has been removed from this location because there is no longer a microfiche reader available; the microfiche was reportedly relocated to the DRMO	Administrative Record, first 9 of 16 CDs (pages 00001 – 78697) Nothing appears to have been added since the 2001 visit
Fort Wainwright DPW Environmental Office **(Main Administrative Record/Docket)** Contact: Joe Malen (907) 353-4512	Administrative Record index and hard copies of all documents on the record	No microfiche at this location	Administrative Record Entire 16 CD set (pages 00001 – 102654)

Recommendations

Recommendations for maintenance of the Administrative Record are summarized in the following table. As in 2001, suggestions focus on whether to discontinue providing the Record in three different media (hard copy, microfiche, and CD) in favor of one media (CD-ROM), which would still meet the legal requirements for NPL site information repositories. It is understood that decisions to discontinue providing the Administrative Record in hard copy or microfiche will also consider whether public involvement goals for this site would continue to be met.

Location	Hard Copy	Microfiche	CDs
Noel Wien Library	Need copies of 2001 Five-Year Review and the Explanation of Significant Differences (ESD) and let the library know that the document should be kept indefinitely[1] Continue to update the collection on a regular basis, unless the decision is made to use CD-ROMs as the exclusive media type	Since microfiche is an outdated media, should consider discarding in favor of CD-ROM. However, if the decision is made to keep this media, the following recommendations apply: • Update record with copies of the 2001 Five-Year Review and the ESD • Provide a two drawer microfiche file box to keep collection in order. • Provide placeholder cards to help ensure microfiche are returned to proper location in file box. • Perform periodic maintenance checks to ensure the collection is complete and in proper order	Need the February 1999 and 2000 updates, as well as copies of the 2001 Five-Year Review and the ESD Since computers are now available for viewing CD-ROMs, should consider making this the primary media for the information repository at this location
Fort Wainwright Post Library	Need copy of the ESD Continue to update the collection on a regular basis, unless the decision is made to use CD-ROMs as the exclusive media type	No action required since no microfiche reader is available at this location	Need the February 1999 and 2000 updates, as well as copies of the 2001 Five-Year Review and the ESD Since computers are now available for viewing CD-ROMs, should consider making this the primary media for the information repository at this location
Fort Wainwright DPW Environmental Office	No action required (i.e., continue to update the collection as reports and other documents become available).	No action required	Update the collection with 2001 edition CDs when available.

[1]It is possible that these documents were delivered to the library but then discarded; the librarian indicated that unless someone speaks with her directly and gives her written direction that a document is required to stay for a certain amount of time, or indefinitely, it is discarded after 6 months to a year.

Potential to Discontinue Maintenance of Paper and Microfiche Copies

USARAK and EPA have discussed the possibility of providing the Administrative Record exclusively on CDs for public use, which would: a) simplify maintenance of the Record at locations with appropriately equipped PCs; b) reduce the use of paper and shelf space; and c) be a "friendlier" medium for today's users than are microfiche. Federal regulations [40 CFR 300.800(c)] state that the lead agency for an NPL site may make the administrative record file available to the public in microform (i.e., microfiche). EPA has indicated that CD's are acceptable as the sole medium for providing the Administrative Record at public repositories if CD-ROM capability is available to users. Computers with the capability to view CD-ROMs are available at both the Noel Wien and the Ft Wainwright Post Libraries.

Another alternative for facilitating public access to the Administrative Record would be for USARAK to post the information currently available on data CDs to the Fort Wainwright internet home pages, which can be accessed using the library's existing internet stations or any PC equipped to access the World Wide Web.

Appendix E

Appendix E

Interview Forms and Responses

INTERVIEW FORMS AND RESPONSES

Interview forms were distributed to personnel listed in the table below during this Five-Year Review. Forms were either emailed (in both MSWord and PDF format) or sent by postage mail. The email was sent out on June 14, 2006; postal mail forms were sent on June 19th, 2006. Copies of the email and distribution letter are attached. Returned forms / responses are provided in the proceeding section.

Agency / Affiliation	Name	Method of Delivery	Response
FWA Garrison Commander	LTC Ronald M. Johnson	Postal Mail	No response
Alaska Department of Environmental Conservation (ADEC)	Ann Farris	Email	No response
	Mike Jaynes	Email	No response
	Kent Monroe	Email	No response
	Sharon Richmond	Email	Completed, returned via email
Directorate of Public Works (DPW)	Karen Dearborn	Email	No response
	Therese Deardorff	Email	Completed, returned via fax
	Linda Douglas	Email	Completed, returned via email
	Cristal Fosbrook	Email	No response
	Joe Malen	Email	No response
	Rielle Markey	Email	No response
Army Environmental Center (AEC)	Joe King	Email	No response
Environmental Protection Agency (EPA)	Bill Adams	Email	No response
	Jacques Gusmano	Email	No response
	Dianne Soderland	Email	No response
Restoration Advisory Board (RAB) Members	(b) (6) [redacted]	Postal Mail	No response
		Postal Mail	No response

Agency / Affiliation	Name	Method of Delivery	Response
	Christine A. Storey (PDC Inc.)	Postal Mail	Returned, no forwarding address
	Tanana Chiefs Conference	Postal Mail	Completed, returned via mail
	(b) (6) [redacted]	Postal Mail	Returned, no forwarding address
	[redacted]	Postal Mail	No response

INTERVIEW FORMS

DISTRIBUTION EMAIL

AND

TRANSMITTAL LETTER

Hazlett, Bob C POA

From: Hazlett, Bob C POA

Sent: Wednesday, June 14, 2006 4:08 PM

To: ann_farris@dec.state.ak.us; Adams.Bill@epamail.epa.gov; Fosbrook, Cristal DPW (FTR) POA; Soderlund.Dianne@epamail.epa.gov; Gusmano.Jacques@epamail.epa.gov; Joe King (joseph.king5@us.army.mil); Joseph Malen (joseph.malen@us.army.mil); karen.dearborn@richardson.army.mil; Kent_Monroe@dec.state.ak.us; mike_jaynes@dec.state.ak.us; rielle.markey@wainwright.army.mil; Sharon_Richmond@dec.state.ak.us; therese.deardorff@richardson.army.mil; Douglass, Linda CIV USA USAG FWA PAO

Cc: Plitnik, Marilyn A POA

Subject: FTW 5-Yr Review - Interview Questionnaire

Attachments: FTW Interview Questionnaire.pdf; FTW Interview Questionnaire.doc

The U.S. Army Corps of Engineers Alaska District has been tasked with preparing the Five-Year Review for remedial activities at the five operable units on Ft Wainwright, Alaska. As part of this review, we would like to get input from those that have been involved with or have had an interest in these projects. With this in mind, we have attached a copy of an interview form for you to fill out. Please go through the questionnaire and answer those questions that are applicable to you.

Please note that the interview form is provided in both MS Word, and PDF format, please use whichever format is preferable. You can return your completed questionnaire via email, fax, or mail. If you would prefer to provide your input via a personal interview, or if you have any questions or comments, please contact us at the following:

Call or Email to:
Marilyn Plitnik (Project Manager)
(907) 753-2881
Marilyn.A.Plitnik@poa02.usace.army.mil

Or

Bob Hazlett (Technical Lead)
(907) 753-2623
Bob.C.Hazlett@poa02.usace.army.mil

Fax to:
Bob Hazlett (907) 753-2820

Mail to:
U.S. Army Corps of Engineers
Alaska District
ATTN: CEPOA-PM-E (Marilyn Plitnik)
P.O. Box 6898
Elmendorf AFB, AK 99506-6898

REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 898
ANCHORAGE, ALASKA 99506-0898

JUN 19 2006

CEPOA-EN-EE-A (200-1f)

PDC, Inc. Consulting Engineers
ATTN: Ms. Christine A. Storey
1028 Aurora Drive
Fairbanks, Alaska 99709

Dear Ms.Storey:

The U.S. Army Corps of Engineers Alaska District has been tasked with preparing the Five-Year Review for remedial activities at the five operable units on Ft Wainwright, Alaska. As part of this review, we would like to get input from those that have been involved with or have had an interest in these projects. With this in mind, we have attached a copy of an interview form for you to fill out. Please go through the questionnaire and answer those questions that are applicable to you.

You can return your completed questionnaire via fax (907-753-2820) or mail (using the self-addressed envelope enclosed). If you would like to receive an electronic copy of this form, or would prefer to provide your input via a personal interview, or if you have any questions or comments, please contact me at Marilyn.A.Plitnik@poa02.usace.army.mil or (907) 753-2881.

FOR THE COMMANDER:

Sincerely,

Marilyn A. Plitnik

Enclosures:

MARILYN A. PLITNIK
Army Environmental
Project Manager

INTERVIEW FORM

RESPONSES

FORT WAINWRIGHT FIVE-YEAR REVIEW
INTERVIEW QUESTIONNAIRE

INTERVIEW RECORD	
Name: Linda Douglass	
Title: Post Public Affairs Officer	Organization: Public Affairs Office
Telephone No.: (907) 353-6701	E-Mail Address: douglasl@wainwright.army.mil
Street Address: 1060 Gaffney Road, #5900	City, State, Zip: Fort Wainwright, AK 99703-5900
Interview Date: 15 Jun 06	Site Name: Fort Wainwright
Interview Type: ☐ Telephone ☐ Visit X Email ☐ Questionnaire (by mail)	
Specific Site Involvement	
Operable Units(s) Worked: X OU1 X OU2 X OU3 X OU4 X OU5	
Date(s) of Involvement: unknown	
Title / Position (with respect to sites): Post Public Affairs Officer	

The following general questions were adapted from the EPA's Comprehensive Five-Year Review Guidance. Please answer any questions that are applicable; if you need more space, you may attach a separate sheet.

INTERVIEW QUESTIONS

1. ***What is your overall impression of the work conducted at the site? (general sentiment)***

   Positive

2. ***From your perspective, what effect have remedial operations at the site had on the surrounding community?***

   Community members appear to be satisfied that the Army has taken steps to solve the problems. I'm not aware of any public dissatisfaction.

3. ***Are you aware of any concerns from the local community regarding the site, operation, administration, implementation, or overall protectiveness of the remedies in the Record of Decision?***

   No

4. ***Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?***

   No

5. ***Are you aware of any changes in land use, access, or other site conditions that have occurred since the last 5-Year Review (2001) that you feel may impact the protectiveness of the site?***

   No

6. ***Are there regular on-site inspections and/or operation, maintenance and monitoring (OMM) presence at the site? What is the frequency of O&M site inspections and activities?***

   Not applicable to PAO

7. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years?

N/A

8. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy?

N/A

9. Have there been opportunities to optimize the operation, maintenance, or sampling efforts? Please describe changes, cost savings, and/or improved efficiency.

N/A

10. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

The Environmental staff has been good about keeping the public informed, and responsive to questions. Excellent group of people for working a sensitive issue with public.

FORT WAINWRIGHT FIVE-YEAR REVIEW
INTERVIEW QUESTIONNAIRE

INTERVIEW RECORD			
Name:	Therese Deardorff		
Title:	~~[illegible]~~ RPM	**Organization:**	USAG AK DPW
Telephone No.:	907 384 2716	**E-Mail Address:**	therese.deardorff@us.army.mil
Street Address:	ATTN: IMPA-FRA-DPWE	**City, State, Zip:**	Ft Richardson 99505
Interview Date:	26 June 2006	**Site Name:**	Fort Wainwright
Interview Type:	☐ Telephone ☐ Visit ☐ Email ☑ Questionnaire (by mail)		
Specific Site Involvement			
Operable Units(s) Worked:	☐ OU1 ☑ OU2 ☑ OU3 ☑ OU4 ☑ OU5		
Date(s) of Involvement:	1996- Present		
Title / Position (with respect to sites):	RPM		

The following general questions were adapted from the EPA's Comprehensive Five-Year Review Guidance. Please answer any questions that are applicable; if you need more space, you may attach a separate sheet.

INTERVIEW QUESTIONS

1. ***What is your overall impression of the work conducted at the site? (general sentiment)***

The work is generally progressing as planned.

2. ***From your perspective, what effect have remedial operations at the site had on the surrounding community?***

They allowed for adjournment of the RAB. Upon the community co-chair's recommendation, and by consensus of the general RAB, the RAB was adjourned. Continuation of the quarterly newsletter was requested and is on-going

3. ***Are you aware of any concerns from the local community regarding the site, operation, administration, implementation, or overall protectiveness of the remedies in the Record of Decision?***

No

4. ***Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?***

Some vandalism of fences at OU3/BHTF was reported w/o damage to any treatment equipment.

5. ***Are you aware of any changes in land use, access, or other site conditions that have occurred since the last 5-Year Review (2001) that you feel may impact the protectiveness of the site?***

New site Town Gardens
EQFS, building proposed w/i areas of ICs but it will remain industrial

6. ***Are there regular on-site inspections and/or operation, maintenance and monitoring (OMM) presence at the site? What is the frequency of O&M site inspections and activities?***

Yes
Quarterly to annually at a minimum

JUN 29 2006 12:51PM HP LASERJET 3200 p.3

7. ***Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years?***

Prior to last 5 year review, escalated cost requirements warranted an ESD for OU3 – but work was also significantly increased.

Up until FY06, there have been no major $ issues. The BUDT may make things more difficult in future years – end of FY06.

8. ***Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy?***

No. NFA

9. ***Have there been opportunities to optimize the operation, maintenance, or sampling efforts? Please describe changes, cost savings, and/or improved efficiency.*** (OM+S)

I believe the frequency of our meetings w/ regulators and contractors allows us to alter monitoring (OM+S) quicker. This, then, allows for greater cost savings. Blasting wells appears to have increased efficiency allowing for quicker shut down of systems.

10. ***Do you have any comments, suggestions, or recommendations regarding the site's management or operation?***

No

(The RPMs are great! :))

FORT WAINWRIGHT FIVE-YEAR REVIEW
INTERVIEW QUESTIONNAIRE

INTERVIEW RECORD	
Name: Sharon Richmond	
Title: Environmental Program Specialist	Organization: Alaska Department of Environmental Conservation
Telephone No.: (907) 451-2158	E-Mail Address: sharon_richmond@dec.state.ak.us
Street Address: 610 University Ave.	City, State, Zip: Fairbanks, AK 99709
Interview Date: 7/18/06	Site Name: Fort Wainwright
Interview Type: ☐ Telephone ☐ Visit X Email ☐ Questionnaire (by mail)	
Specific Site Involvement	
Operable Units(s) Worked: X OU1 X OU2 X OU3 X OU4 X OU5	
Date(s) of Involvement: July 2003 to present	
Title / Position (with respect to sites): Project Manager / State regulator	

The following general questions were adapted from the EPA's Comprehensive Five-Year Review Guidance. Please answer any questions that are applicable; if you need more space, you may attach a separate sheet.

INTERVIEW QUESTIONS

1. ***What is your overall impression of the work conducted at the site? (general sentiment)***

   Very good. Work performed meets objectives.

2. ***From your perspective, what effect have remedial operations at the site had on the surrounding community?***

   I don't get very many public inquiries about this facility but I do tell callers that the Army is doing a good job and the State has a good working relationship with them and the EPA. Callers are generally pleased to hear this positive reinforcement.

3. ***Are you aware of any concerns from the local community regarding the site, operation, administration, implementation, or overall protectiveness of the remedies in the Record of Decision?***

There was some public concern regarding housing construction near the Birch Hill Tank Farm (OU3) but it was due to the misperception that contamination from the Tank Farm had contaminated the new housing construction site. I provided current monitoring information and site status and they were satisfied that contamination was not an issue.

There has been some public concern regarding contamination discovered during various construction activities but the Army keeps site workers and the public informed, as necessary.

4. ***Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?***

The new owner of the property adjacent to the Birch Hill Tank Farm (OU3) destroyed a number of shallow and bedrock aquifer monitoring wells that were part of the Birch Hill Tank Farm groundwater monitoring program. This action was performed without Army, EPA or ADEC approval. RPMs are evaluating how to address this matter.

5. ***Are you aware of any changes in land use, access, or other site conditions that have occurred since the last 5-Year Review (2001) that you feel may impact the protectiveness of the site?***

How will newly discovered contamination, such at the FTWW 102 Communications site (Taku Gardens) the 5 year review? Also, land use has changed from industrial to residential in a number of other locations.

6. ***Are there regular on-site inspections and/or operation, maintenance and monitoring (OMM) presence at the site? What is the frequency of O&M site inspections and activities?***

Yes. Multiple treatment systems have regularly scheduled OM&M, typically on a weekly basis when systems are operational and less frequently when systems are shut down for the season.

7. ***Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years?***

The treatment system at Buildings 2111/2112 had to be installed partially below grade because the sites are located on an active airfield with height restrictions. This configuration caused seasonal flooding and equipment malfunctions. This problem has since been corrected. I have no comment on costs.

8. ***Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy?***

Many treatment systems have been shut down for rebound testing. These systems had reached a point of diminishing return or RAOs had been met. Continued groundwater monitoring is in place at all sites where treatment systems have been shut down. Should contaminant concentrations rise, systems will be restarted or other treatment strategies will be evaluated and implemented. At other sites, sampling frequency has been reduced because contaminant concentrations have clearly been stable or decreasing. These actions do not affect protectiveness or effectiveness of the remedy.

9. ***Have there been opportunities to optimize the operation, maintenance, or sampling efforts? Please describe changes, cost savings, and/or improved efficiency.***

Yes. It has been possible, for example, to shut down thermal oxidizers in OU5, thereby reducing operation and monitoring expenses. Some sites have had a reduction in sampling frequency because it has been clearly demonstrated that contaminant concentrations are stable or receding. Many sparge points at several sites were successfully redeveloped, which greatly increased treatment effectiveness. We have also had the opportunity to implement a Triad-style, dynamic work-plan approach at some sites, which has greatly increased site investigation efficiency. Other treatment systems, for example the AS/SVE systems at the DRMO, have been reconfigured to maximize treatment effectiveness in remaining hot spots.

10. ***Do you have any comments, suggestions, or recommendations regarding the site's management or operation?***

I am very satisfied with the management of this facility.

JUN 19 2006

FORT WAINWRIGHT FIVE-YEAR REVIEW
INTERVIEW QUESTIONNAIRE

INTERVIEW RECORD	
Name: Robert Sattler	
Title: Envir. Quality Analyst	Organization: Tanana Chiefs Conference
Telephone No.: 907 452-8251	E-Mail Address: rsattler@tananachiefs.org
Street Address: 122 First Ave. Suite 600	City, State, Zip: Fairbanks, AK 99701
Interview Date: 9/16/06	Site Name: Fort Wainwright
Interview Type: ☐ Telephone ☐ Visit ☐ Email ☒ Questionnaire (by mail)	
Specific Site Involvement	
Operable Units(s) Worked: ☐ OU1 ☐ OU2 ☐ OU3 ☐ OU4 ☐ OU5	
Date(s) of Involvement:	
Title / Position (with respect to sites): Participated in RAB Mtgs.	

The following general questions were adapted from the EPA's Comprehensive Five-Year Review Guidance. Please answer any questions that are applicable; if you need more space, you may attach a separate sheet.

INTERVIEW QUESTIONS

1. ***What is your overall impression of the work conducted at the site? (general sentiment)***

The Army has sunk a substantial level of funding into the IRP.

2. ***From your perspective, what effect have remedial operations at the site had on the surrounding community?***

The investigations reveal the suspected and known extent of the hazardous waste issues - and become available for public review in the ~~[illegible]~~ administrative record at the local library.

3. ***Are you aware of any concerns from the local community regarding the site, operation, administration, implementation, or overall protectiveness of the remedies in the Record of Decision?***

Only the discovery of hazardous waste during construction projects last summer and this year.

4. ***Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?***

Issues stemming from inadvertent discoveries during construction.

5. ***Are you aware of any changes in land use, access, or other site conditions that have occurred since the last 5-Year Review (2001) that you feel may impact the protectiveness of the site?***

—

6. ***Are there regular on-site inspections and/or operation, maintenance and monitoring (OMM) presence at the site? What is the frequency of O&M site inspections and activities?***

—

7. ***Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years?***

—

8. ***Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy?***

—

9. ***Have there been opportunities to optimize the operation, maintenance, or sampling efforts? Please describe changes, cost savings, and/or improved efficiency.***

—

10. ***Do you have any comments, suggestions, or recommendations regarding the site's management or operation?***

Given the discoveries of hazardous waste during construction the past two years - perhaps a new phase of investigations is warranted for those areas.

Appendix F

Appendix F

List of Source Areas at Ft Wainwright and POL Two-Party Listed Sites Tracking Tables

Table F-1. Source Areas Listed by Operable Unit
(as defined in Attachment A of the Federal Facilities Agreement)

Source Areas in Operable Unit 1

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Alaska Railroad Storage Yard			NFA 6-Jan-95	
Beacon Tower landfill	Beacon Tower Drum Site		NFA 26-Jun-92	
Blair Lakes Drum Site		Drum removal	NFA 25-Jul-94	
Birch Hill Radioactive Waste Site			NFA 21-Mar-93	
Building 1128	Building 1128 Transformer Yard Drum Site		NFA 26-Jun-92	
Building 1567			NFA 10-Apr-95	
Building 1599			Transferred 2-Party	
Building 2077			Transferred 2-Party	IC under 2-Party Agreement
Building 2250			Transferred 2-Party	LTM 2-Party
Building 3015			NFA 10-Apr-95	Closed 2-Party
Burial Site M			NFA 26-Jun-92	
Chemical Warfare Disposal Area	Chemical Agent Dump Site	Interim Action ROD	NFA	
Drum Site West of DRMO	Site N-4		NFA OU1 ROD	
Blair Lakes Alpha Impact Area	Former Explosives Ordnance Detonation (EOD) Range		Transferred OU5 ROD	
Motor Pools Buildings (13 sites) *	1053, 1054, 1168, 3015, 3421(2), 3425(2), 3479(2), 3485(2), 3487		Transferred OU5 ROD	NFA OU5 ROD
Runway Radioactive Waste Site			NFA 26-Jun-92	
Trainor Gate Railroad Spur			NFA 30-Sep-92	

Source Areas in Operable Unit 1

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Building 3019	Transformer Storage Yard East of 3019		NFA 25-Jul-94	
Utilidor Expansion Drum Site			NFA 26-Jun-92	
Sites moved from OU2 to OU1 after FFA signature				
Drum Site South of the Landfill		Removal	NFA 25-Jul-94	
Engineer Park Drum Site		Removal	NFA 25-Jul-94	
801 Drum Burial Site		Removal	ROD OU1	Remedial Action

*Motor Pools Buildings included: Bldgs 1053, 1054, 1168, 3015, 3421A&B, 3425A&B, 3479, 3480, 3485A&B, and 3487.

Source Areas in Operable Unit 2

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Building 1168	Bldg 1168 Leach Well		ROD OU2	LTM
Building 3477			NFA 13-Jan-94	
801 Drum Burial Site		Transferred OU1	ROD OU1	Remedial Action
Tar Sites (4)			NFA 3-Jun-94	ADEC Solid Waste
Engineer Park Drum Site		Transferred OU1	NFA OU1 ROD	
Drum Site South of the Landfill	N-4	Transferred OU1	NFA OU1 ROD	
DRMO	DRMO 1&4			Remedial Action
Sites added after FFA signature				
North Post Site		Removal	Transferred 2-Party / OU2 ROD	LTM

Source Areas in Operable Unit 3

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Fairbanks Fuel Terminal	Birch Hill Tank Farm; Remedial Area 1B		OU3 ROD and ESD	Remedial action
Fairbanks-Eielson Pipeline	Milepost 2.7 & 3.0 and 15.75		OU3 ROD and ESD	Remedial action
Sites added after FFA signature				
Railcar Off-Loading Facility	ROLF		OU3 ROD and ESD	Remedial action
Remedial Area 1A	Birch Hill Above Ground Storage Area		Transferred OU5 ROD	Remedial Action

Source Areas in Operable Unit 4

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Landfill			OU4 ROD	Remedial Action
Power Plant Coal Yard	CSY		OU4 ROD	Remedial Action
Fire Training Pits	FTP	Removal	NFA 1-Sep-96	

Source Areas in Operable Unit 5

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Open Burning/Open Detonation	OB/OD		NFA OU5	RCRA Deferred
Sites referred to OU5 from other Operable Units				
Blair Lakes Alpha Impact Area	Former Explosives Ordnance Detonation (EOD) Range		Transferred from OU1	NFA OU5 ROD
Motor Pools Buildings (13 sites)	1053, 1054, 1168, 3015, 3421(2), 3425(2), 3479(2), 3485(2), 3487		Transferred from OU1	NFA OU5 ROD
Fairbanks Fuel Terminal AST	Remedial Area 1a / Birch Hill Tank Farm ASTs		Transferred From OU3	Remedial Action
Sites added after FFA signature				
WQFS	WQFS 1, 2, 3		OU5 ROD	Remedial Action
	WQFS 4		Transferred 2-Party / OU5 ROD	NFA
EQFS			OU5 ROD	Remedial Action

Additional No Further Action Sites in Operable Unit 5 - 10 April 1995		
Ammo Storage	Floor Drains	One Lane Bridge
Blair Lakes Maneuver Area	Former Sewage Treatment Plant	South Side Treatment Plant Storage Area
Bldg 3026, Pest Control Shop	Former Storage Area	Trailer Park Open Dump
Bldg 4065, Hospital	Gravel Pit	Vehicle Wash Stations
Clear Creek Landfill	In-Service Transformers	Vet Clinic Leach field / Incinerator
Dennis Manor Riverbank Dump	North Wastewater Treatment Plant	Water Treatment Plant
Dry Cleaning Shop		

Table F-2. POL TWO-PARTY LISTED SITES TRACKING TABLES
September 2006

POL SOURCE AREAS
CONDUCTING ACTIVE TREATMENT or INSTITUTIONAL CONTROLS

SITE IDENTIFICATION		SITE STATUS REPORT
Building 2111/2112 ***Active Air Sparging*** ***DERA*** Final 1999 Sys Eval Rpt, Aug 00 D/O; Chem Data Rpt, Spr 00 g/w monitoring Sep 00, COE; Draft 2000 System Operating Report, Feb 01, D/O	*IAP #:FTWW-087* *ADEC #:199031X021832 /199331X013302* *TNK #254-257/332-334* *ADEC FILE Number: 108.26.006/108.26.013*	*Buildings 2111/2112 were decommissioned in July 1995 when refueling operations shifted to a FARP (the temporary refueling point until another system was constructed). Completion of the demolition, excavation, and removal of Buildings 2111/2112 and the associated USTs/piping was completed in June 1996. Remediation of former Bldgs 2111/2112 will be through an air sparging treatment system which commenced summer 1996. Jan 99: Oct 98 samples show Benzene in g/w at 840 ppb; DRO at 4900 ppb; & GRO at 24K ppb. System operation will continue.* Apr 01: System will be optimized to better treat hot spots. Sampling pre and post operation will continue. *Reference UPC #FTW125.2004: Spring GW sampling occurred. System startup in May April 05, Fall gw sampling conducted week of October 15, 04. Three new wells installed July 2006: New monitoring wells installed to replace wells that were underwater during break up 19 September 2006 Treatment System off for rebound. Will evaluate starting treatment system in 07.*
Building 3570-Neely Road	*IAP #:FTWW-101* *ADEC #:200131x125601* *TNK #* *ADEC FILE Number:108.38.078*	*2002 Site discovery and release investigation 2003: 2003: GW sampling to occur in 2004. ROST report being finalized. 2004: Site investigation completed and additional wells installed. Workplan for TRTMT/monitoring completed. 2005:Elevated DRO,GRO,Benzene and 1,2 Dichloroethane in AP-9003. Chloromethane in well AP-8213 AS/SVE system with air oxidizer started up. Air complaints 2006: AS system only with air trtmt . System run only part of summer due to complaints. C.Soil Piles onsite over summer.*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 1002 [FTWW-095{3A}] ***LTM*** ***DERA*** Final 2000 Final Status Report and Respiration Testing, Bldgs 1002, 1168 and 2250, FWA, Dec 00	*IAP #:FTWW-095* *ADEC #:199531X924402* *TNK #202* *ADEC FILE Number:108.26.030*	*A combined air sparging/bioventing treatment system was installed and activated at Building 1002 during the Release Investigation. Monitoring of the system will be conducted to assess remediation progress and to determine when remediation has occurred. Aug 98: Clean confirmatory samples are anticipated. Oct 98 samples show benzene still above MCLs (29.7ppb). System will run for another season, through 1999. Apr 01: Benzene remains high (21.5 ppb); system will operate in 2001. Reference UPC # FTW125. ** A closure letter has been received from ADEC for the 35 cubic yards of soil removed from the tank excavation. 2002: AS/SVE system discontinued. 2003 Trtmt system decommissioned. May 2004: LongTermMonitoring plan Sample one well every other year. Next montiroing event April 05, No sampling was conducted in 2004.June 05 July 2006: No action required.*
Building 1168 [FTWW-097{3A}] ***LTM*** ***DERA*** Final 2000 Final Status Report and Respiration Testing, Bldgs 1002, 1168 and 2250, FWA, Dec 00	*IAP #:FTWW-097* *ADEC #:199531X924302* *TNK #213* *ADEC FILE Number:108.38.067.06*	*A combined air sparging/bioventing treatment system was installed and activated at Building 1168 during the Release Investigation. Monitoring of the system will be conducted to assess remediation progress and to determine when remediation has occurred. (Separate from the UST is a dry well (oil/water separator) which falls under the Three Party OU 2, currently operating a air sparging/soil vapor extraction treatment system installed in the winter of 1994, now off and being removed.) Fall 1998: Results warrant continued operation of system for at least another year. New SVE wells to be installed in 1999. Apr 01: Results low enough to warrant system being turned off; G/w will be sampled yearly; soil every 3 years (LTM Plan being developed.) Reference UPC # FTW125. ** A closure letter has been received from ADEC for the 165 cubic yards of soil removed from the tank excavation.* ***2003: Trtmt system decommissioned May 04 – decommissioned 3 dry wells. Next monitoring event summer 05*** *July 2006: Conditional Closure Letter issued in March 2005*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 1172 ***[FTWW-098 {3A}]*** ***NFA*** ***DERA*** **DRO at .43 ppm g/w** Tech Memo: G/W Monitoring, Mar 00(COE)	*IAP #:FTWW-098 ADEC #:199331X013303 TNK #215 216 ADEC FILE Number:108.26.019*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to determine if the downward trend of DRO contamination is continuing and to be certain that the downward trend or nondetection of GRO and BTEX compounds has stabilized or has not recurred. Feb 99: Site will be sampled once in 1999; based on those results, closure will be negotiated with state. Apr 01: State will evaluate for closure. Reference UPC # FTW125 2003 No Action, 2004 No Action 2005 No Action Letter from ADEC 23 Mar 2005 This site appears to be ready for NFRAP.*
Building 2062 & 2063 ***GW 5.2 ppm DRO*** ***Soil 14K ppm DRO*** ***Intrinsic Remediation*** ***VENC*** Draft Work Plan Sep 99; COE 17 Apr 00 well installation report 2005 Sampling Report Two Party Sites Dec. 2005 FES	*IAP #: ADEC #:199531X034802/199531X 034804 TNK #244/245 ADEC FILE Number:108.38.082,108.26. 036 108.38.082 108.26.036*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996. Work consisted of installing and sampling soil and groundwater probes. Based upon the RI report, intrinsic remediation will begin on this site began in 1997 and will run through 1998. Feb 99: Based on Sep 98, recommend LTM continue while active remediation discussed. Apr 01: Awaiting 2000 results/report; LTM should continue. Reference UPC # FTW125 2004 GW sampling occurred..10 wells and installed one new well to be sampled Fall 05 2005 Sampling 7 wells sampled. DRO only contaminant of concern, but concentrations exceed ADEC cleanup levels. Highest DRO value 12.0 ppm.*
Building 2077 ***(FTWW-003{2A})*** ***Intrinsic Remediation*** ***DERA*** **Benzene 127 ppb g/w** **DRO 2.1 ppm g/w** **Benzene 31.1 ppm soil** 2000 Status Report and Respiration Testing Bldg 2077, FWA, Nov 00, ENSR	*IAP #:FTWW-003 ADEC #:199031X921807 TNK # ADEC FILE Number:108.38.021*	*This site was part of OU-1. Investigation results indicate containimation of groundwater and soil with DRO, heavy metals, PAH, and BTEX. This site was investigated under OU-1's Management Plan. Due to the types of contamination at this stie, RPMs have agreed (in the OU-1 ROD) that this source area will be transferred to and remediated under the Two-Party Agreement. A soil vapor extraction system was installed Summer of 1997. Aug 98: Clean confirmatory sampling expected. Dec 98: results indicate benzene still above MCLs in G/W (1500 ppb), as well as DRO/GRO. System will continue to run. Expansion or removal action to be discussed. Apr 01: No expansion will take place. Small removal action planned for Summer 01; system should operate around removal action. LTM plan will be developed post-removal sampling. 2003: Removal Action occurred. 2004 Installed one new monitoring well. Gw sampled in new well. Elevated concentrations of GRO and Benzene remain..Next monitoring event scheduled summer of 05. 2005: June 05 monitoring even showed elevated levels of GRO and benzene. Hopefully levels will decrease because of the substantial removal action. July 2006: No Action*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 2250 ***(Golf Course)*** ***[FTWW-100 {3A}]*** ***Active SVE/AS*** *DERA* DRO 1.58 ppm g/w DRO 15,100 ppm soil Final 2000 Status Report & Respiration Testing, Bldgs 1002, 1168 & 2250 Dec 00 (ENSR)	*IAP #:FTWW-100* *ADEC #:199531X924403* *199031X921803* *TNK #UNK* *ADEC FILE* *Number:108.38.081*	*ADEC closure has been obtained for the unknown 500- gallon gasoline tank; however, ADEC closure has not been obtained for the contamination that exists at the site unrelated to the UST. A combined air sparging/soil vapor extraction treatment system was installed and activated during the Release Investigation. Feb 99: Based on 98 sampling results, system operation will continue. Additional SVE wells may be added in 1999. Apr 01: Continue operation converting new soil borings into new SVE/AS wells; write 01 report with eye toward State requirements for ACLs. Reference UPC #FTW125 2004: ROST study completed. Replaced SVE Blower. GW sampleing occurred in May/June. 2004: CLOSES report. Contaminant is DRO Only. Recommend conditional closure. Sample 2 wells for DRO only once every 5 years. 2005: Sampling in June show43d an overall decrease in DRO but an increase in DRO in downgradient wells.*
Building 3425 ***[FTWW-89;NFA]*** ***Soil removal completed July 1997*** ***VENC*** **Benzene 17 ppb g/w** **DRO 2.6 ppm g/w** **GRO 2.9 ppm g/w** Tech Memo: G/W Monitoring, March 00(COE)	*IAP #:FTWW-089* *ADEC #:199031X025901* *TNK #323* *ADEC FILE* *Number:108.26.014*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC recommends semi-annual groundwater monitoring, to determine if the upward trend of DRO contamination is continuing. The isolated soil contamination, which is believed to be the result of a surface spill, was excavated and thermally remediated as a removal action under a contract. July 98: Upon removal of all soils, and receipt of the sampling results, the site was to be recommended for closure: Feb 99: This has already been closed in DSERTS. However, 1998 results show a small plume with elevated benzene levels (35 ppb). Another round of sampling will take place early 1999 to determine next step. Apr 01: Site was not sampled in 00; after 01 sampling event, will be evaluated for potential decreases in monitoring requirements. Reference UPC # FTW125* *July 2006: No Action*
Building 3481 (Motor Pool) ***FTWW-056; {3A}]*** ***LTM*** ***Benzene .43 ppb g/w*** ***GRO .77 ppm g/w*** ***DRO 2.4 ppm g/w*** ***DERA*** Tech Memo: G/W Monitoring, Mar 00(COE)	*IAP #:FTWW-056* *ADEC #:199031X021829* *TNK #275 276* *ADEC FILE* *Number:108.26.017*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to determine if the downward trend of DRO contamination is continuing and to be certain that the detection of GRO and BTEX compounds has not recurred. This groundwater sampling event should be tied to the sampling of Building 3483, since the RI revealed the commingling of the groundwater plumes for both buildings. Semi-annual monitoring has been conducted. Feb 99: Monitoring will continue to ensure natural attenuation is occuring and when cleanup levels are reached. Apr 01: Site not sampled in 00; upon 01 event, will evaluate decrease in monitoring requirements. Reference UPC # FTW125* *July 2006: No Action*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 3483 (Motor Pool) ***[FTWW-057 {3A}]*** ***LTM*** ***DERA*** **May 00 benzene 5.8 ppb g/w DRO 3.25 ppm g/w Sep 00** Apr 00 Draft 99 Monitoring Report, Bldgs 1546 & 3483 (H/C)	*IAP #:FTWW-057* *ADEC #:199231X026002* *TNK # 277 278* *ADEC FILE Number: 108.26.005*	*A soil vapor extracting/air sparging treatment system was installed by FERtech Environmental Systems (FERtech) in the fall of 1994 to remediate the soil contamination at Building 3483. Prior to FERtech's bankruptcy, the treatment system operated for several months. Harding Lawson and Associates assumed the treatment system, conducted an assessment of the system, installed system modifications where required, and began running the system in the summer of 1995. Feb 99: Based on 98 results, and benzene rebounds, spring 99 sampling event will determine if rebound occurred while system off. System may be run another year if warranted; if not, LTM and site closure plans will be negotiated. Apr 01: Upon receipt of 00 report, will evaluate LTM requirements. Reference UPC #FTW125 2004: ADEC agreed to decommission trtmt systems.* *July 2006:*
Building 3562 (PX) ***[FTWW-086 {3A}]*** ***NFA*** Bldg 3562 PX Service Station (bldg 3562) Confirmational G/W sampling TM, 8/00, COE	*IAP # FTWW-086* *ADEC #:199031x021806* *TNK# 279-282* *ADEC FILE Number: 108.26.025*	*Remediation of contamination at this site is through an air sparging/soil vapor extraction treatment system. Confirmation soil borings were completed on 25 June 1995 to access the effectiveness of the treatment system. The treatment system will be operated at this site until remediation of the existing contamination is accomplished. Aug 98: Written closure letter received from State July 98, setting forth LTM until below MCLs. LTM will continue. Apr 01: Followed State requirements for LTM; met conditions of letter. State will review for final closure. Reference UPC # FTW125. July 2006: No new action*
Building 3564 (Standby gen plant) ***[FTWW-099 {3A}]*** ***LTM*** ***DERA*** **Benzene 5.5 ppb g/w 00 results** Bldg 3564 Ann Rpt 7/99-7/00, Jan 01 (CH2); draft LTM Plan (CH2)	*IAP #:FTWW-099* *ADEC #:199531x924201* *TNK # 283,284* *ADEC FILE Number: 108.26.028*	*Remediation of contamination at this site commenced in the summer of 1996 by implementing an air sparging/soil vapor extraction treatment system. Feb 99: System recommended to run through 1999 season. LTM Plan will be recommended in next report. Building will be demolished in 1999; system will have to be off during the process. Apr 01: Bldg demo'd in 99, system restarted and ran until July 00. Will evaluate report and develop LTM Plan. System to be decommissioned/moved in 01. Reference UPC # FTW125 2002: Continue LTM and evaluate rebound 2003: no action 2004: gw sampling occurred. 8 wells sampled DRO and RRO exceeded cleanup levels. Plume not increasing. 2005: 4 of 6 wells exceeded ADEC cleanup levels for DRO* *July 2006:*
Building 5110 ***[FTWW-085 {3A}]*** ***Intrinsic remediation/LTM*** ***DERA*** **Benzene 98 ppb g/w BTEX 2078 ppb g/w GRO 10K ppb g/w DRO 270K ppb g/w** Coe, G/W Monitoring Report, March 2000 (COE)	*IAP #:FTWW-085* *ADEC #:199231x131002* *TNK #317* *ADEC FILE Number: 108.38.037*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to determine if the downward trend in BTEX, DRO, and GRO continues and to monitor the downgradient early warning wells to ensure that potential offsite receptors are not threatened. Semi-annual monitoring has been conducted since 1996 Feb 99: 1998 results show no migration is occurring. Wells will continue to be monitored, and IR will continue for second year. Apr 01: Site not sampled in 00; will be sampled in 01 and LTM Plan evaluated for decrease in frequency after results reviewed. Reference UPC # FTW125. ** A closure letter has been received from ADEC for the unknown quantity of soil removed from the tank excavation.* *2002: Determine frequency of monitoring 2003 Draft Closes Report 2004 No Action 2005 Groundwater monitoring occurred.*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
North Post Sites 3 and 4 ***North Post Site 3: CLOSED*** ***North Post Site 4: (FTWW-050 {1A})*** ***LTM*** ***DRO 273 ppm 7/99 g/w*** ***1,2,4 TMB 16.6 ppb g/w*** ***1,3,5 TMB 13 ppb 3/99 g/w*** ***DERA*** 1999 Monitoring Report, No Post & DRMO, Jun 00 (H/C)	*IAP #: FTWW-050* *ADEC #:199031x921811* *TNK #* *ADEC FILE Number*	*The North Post Site was referred from Two-Party to Three Party Operable Unit 2, where extensive investigations were conducted. Based on those investigations, the North Post Site was referred back to the Two-Party and will be addressed as such. The proposed remediation for North Post Site 4 was an air sparging/soil vapor extraction treatment system and PAH soil excavation and thermal remediation. The treatment system was installed in the summer of 1996. Feb 99: Based on 1998 results, system operation will continue with possible modifications to system. Apr 01: Awaiting report to determine LTM Plan. System was shut off in Nov 00, and was last sampled at that time. System will not be removed yet this summer. ** A closure letter has been received from ADEC for North Post Site 3 and the 1,240 cubic yards of soil generated from both North Post Sites 3 and 4. 2004 GW Sampling occurred. 10 wells were sampled. Need to verify gw flow direction and assess natural attenuation. CLOSES report complete DRO contamination with benzene in one small area. Need rebound information. If no rebound Army will request conditional closure.*

POL SOURCE AREAS
MISCELLANEOUS ITEMS

SITE IDENTIFICATION		SITE STATUS REPORT
Vehicle Wash Rack Forward Air Refuleing Point (FARP) ***NFA: Not a CERCLA Restoration Site***	*IAP #: CC FTWW 001* *ADEC #:199531X134801* *TNK # 924* *ADEC FILE Number: 108.26.034*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work commenced in May 1996 and consists of installing and sampling soil and groundwater probes. It was determined that current operations and practices caused spills and potential contamination in this area. Therefore, this site is not CERCLA eligible, will not be addressed under the Two-Party POL Agreement, and no closure letter is required. Action at this site will be addressed IAW 18 AAC 75. One well AP-9081 installed as close as possible to wells installed during 1996 release investigation. GRO and DRO detected at concentrations below ADEC cleanup levels. No BTEX. DRP and GRP present, but below Cleanup levels. Moved into the Compliance Cleanup Program.*

POL SOURCE AREAS
REFERRED TO ANOTHER PROGRAM or OPERABLE UNIT

ITE IDENTIFICATION		SITE STATUS REPORT
Building 1053 [FTWW-005; NFA]	*IAP #:FTWW-005 ADEC #:199031-921805 TNK # ADEC FILE Number: 108.38.071.0*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site. **A closure letter has been received from ADEC for the 10 cubic yards of soil removed from the tank excavation, since the soil is being handled under the Two-Party.*
Buildidng 1054	*IAP# ADEC #: 199431x107702 TNK# ADEC FILE Number: 108.38.068*	*NFA for Soils.. Groundwater referred to OU5 FTW CERCLA FEDERAL FACILITY AGREEMENT RECOMMENDED ACTION 3 June 1994 ADMIN RECORD Page 50087*
Building 1059	*IAP #: ADEC #: TNK # ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
Building 1060 [FTWW-088]	*IAP #:FTWW-088 ADEC #:199331X013305 TNK #208 ADEC FILE Number: 108.26.012*	*ADEC closure was received for UST 208. Building 1060 was referred from the Two-Party to OU 5 (Three Party Agreement), based on the upgradient groundwater contamination source. ADEC closure is not required for this site based on the referral to OU 5. This site has an on-going SVE/AS treatment system to address groundwater contamination. Reference UPC # FTW125. ** A closure letter has been received from ADEC for the unknown quantity of soil removed from the tank excavation.*
Building 1070	*IAP #: ADEC #: TNK # ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.* ***** A closure letter is anticipated from ADEC for the 220 cubic yards of soil removed from the transfer line excavation.***
Building 1173	*IAP #: ADEC #: TNK # ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 3, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
Building 1565 [FTWW-019]	*IAP #:FTWW-019 ADEC #: TNK #325 ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
Building 1599 Institutional Controls VENC	*IAP FTWW-026 ADEC #:199031X921808 TNK # ADEC FILE Number: 108.38.065*	*The 1995 OU1 RI revealed only petroleum contamination at levels exceeding ADEC cleanup levels. Therefore, in accordance with the June 1997 ROD for OU1, Building 1599 has been referred to the Two Party Agreement for enforcement of Institutional Controls.*

POL SOURCE AREAS
REFERRED TO ANOTHER PROGRAM or OPERABLE UNIT

ITE IDENTIFICATION		SITE STATUS REPORT
Building 3595 ***[FTWW-011]***	*IAP #:FTWW--11* *ADEC #:199331X007101* *TNK #295,351,352* *ADEC FILE Number: 108.26.021*	*ADEC closure was received for USTs 295 and 352. Referred from Two-Party to Three Party OU 4 for groundwater contamination unrelated to the USTs, removing this site from the Two-Party Agreement. ADEC closure is not required for the remaining groundwater contamination at this site.*
Pipeline Break North Post ***[FTWW-081]***	*IAP #:FTWW-081* *ADEC #:199031X921811* *TNK #* *ADEC FILE Number: 108.38.069*	*Referred from Two-Party to Three Party OU 3, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
DRMO POL Sites ***(Former Bldgs 5001,3,6)*** ***[FTWW-091{1A}]*** ***SVE/AS System*** ***DERA***	*IAP #:FTWW-091* *ADEC #:199531X924401* *TNK #311,312,314,357,358* *ADEC FILE Number:*	*The Site Assessment and Release Investigation reports for Building 5001, USTs 311, 312, 314, 357 and 358, were delivered to ADEC recommending site closure for USTs 311, 312, 357, and 358. A closure letter is anticipated from ADEC for USTs 311, 312, 357, and 358. The soil and groundwater contamination associated with UST 314, 315, and 316 will be addressed with a soil vapor extraction/air sparging treatment system. This system was installed during the Summer of 1996 and will address the downgradient groundwater contamination that has migrated near Building 5006. An additional system may be installed to treat petroleum contaminated soils since Building 5001 has been demolished. Feb 99: 1998 results indicate DRO at 17600 ppb in g/w. System operation will continue. Options for expansion and other alternatives will be discussed. Apr 01: Site will be reviewed in conjunction with OU2 sites; 00 report has not been received. Upon receipt, will evaluate operations/monitoring requirements. Reference UPC # FTW125. ** A closure letter has been received from ADEC for USTs 311, 312, 357, 358, and 23 cubic yards of soil associated with USTs 357/358.* ***After2004 these 2 Party sites will be considered with the OU2 DRMO sites.***
Tar Sites (W of FWA So. Post soccer field; Glass Park next to Bldg 4040; NW of the FWA Golf Source; W of Power Plant Cooling Pond)	*IAP #:FTWW-078* *ADEC #:* *TNK #* *ADEC FILE Number: 108.15.001*	*The sites were reportedly used as tar disposal areas. Because of concerns of leachate release, the sites were included in the FFA for further investigation. Sampling conducted in 1992, and the analytical results of the sampling including TCLP analysis, showed no potential for groundwater contamination. A CERCLA FFA NFA document was signed by the RPMs in 1994. Any further actions associated with these sites will be coordinated with the Solid Waste/Pollution Prevention program of ADEC.*

TWO PARTY SITES REQUIRING
OTHER ACTION or INSTITUTIONAL CONTROLS

SITE IDENTIFICATION		SITE STATUS REPORT
Birch Hill AST Tank Farm ***NO ACTION UNTIL TANKS ARE TO BE REMOVED***	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number*	*The Birch Hill AST Tank Farm was investigated under Operable Unit 3 of the Three Party Agreement. Due to the size and complexity of this site, it was broken out into two sub-areas: subarea 1A, which includes the ASTs (OU5), and subarea 1B (OU3), which includes everything remaining (i.e., the area between the truck fill stand and the base of Birch Hill and the area south of the truck fill stand, which includes Valve Pit A). Subarea 1A was moved from Operable Unit 3 to Operable Unit 5, and will will remain a Three Party source area, as stipulated in the Operable Unit 3 Record of Decision. Subarea 1A, the ASTs, was referred from the Three Party, Operable Unit 3, to the Two-Party Agreement. As such, only the ASTs will be addressed under the Two-Party. No action will be taken until such time as the tanks are removed.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 1056	*IAP #:* *ADEC #:* *TNK #325* *ADEC FILE Number*	*UST removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable.*
Building 1168 ***[FTWW-097{3A}]*** ***LTM*** ***DERA*** Final 2000 Final Status Report and Respiration Testing, Bldgs 1002, 1168 and 2250, FWA, Dec 00	*IAP #:FTWW-097* *ADEC #:199531X924302* *TNK #213* *ADEC FILE Number:108.38.067.06*	*A combined air sparging/bioventing treatment system was installed and activated at Building 1168 during the Release Investigation. Monitoring of the system will be conducted to assess remediation progress and to determine when remediation has occurred. (Separate from the UST is a dry well (oil/water separator) which falls under the Three Party OU 2, currently operating a air sparging/soil vapor extraction treatment system installed in the winter of 1994, now off and being removed.) Fall 1998: Results warrant continued operation of system for at least another year. New SVE wells to be installed in 1999. Apr 01: Results low enough to warrant system being turned off; G/w will be sampled yearly; soil every 3 years (LTM Plan being developed.) Reference UPC # FTW125. ** A closure letter has been received from ADEC for the 165 cubic yards of soil removed from the tank excavation.* ***2003: Trtmt system decommissioned May 04 – decommissioned 3 dry wells. Next monitoring event summer 05*** *July 2006: Conditional Closure Letter issued in March 2005*
Building 1191	*IAP #:* *ADEC #:199531x034801* *TNK #219* *ADEC FILE Number108.26.040*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996. Work consisted of installation and sampling soil and groundwater probes. (UPC #FTW125) Based on the draft RI and discussions on 5 Dec 96, a closure letter was received from the State on 28 May 1997. A closure letter was received July 1999, from ADEC for the 60 cubic yards of soil removed from the tank excavation.*
Building 1514 ***[FTWW-063; NFA]*** ***Conditional Closure***	*IAP #:ftww-063* *ADEC #:199231x026003* *TNK #221-224* *ADEC FILE Number108.26.008*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to confirm the downward trend of the contaminant levels and monitor the movement of GRO and BTEX contamination. Semi-annual monitoring has continued, and a downward trend in the contaminant levels, from the 1991 sampling event, has been observed. A closure letter was received from the State on December 17, 1999. Reference UPC # FTW125. ** A closure letter was received July 1999 from ADEC for the unknown quantity of soil removed from the excavation of the tanks.*
Bldg 1541	*IAP#:* *ADEC #:* *TNK #* *ADEC File Number: 108.26.046*	*NFA action issued by the state 31 Jan 1996*
Bldg 1543		*NFA issued by the state 7 Feb 1994*
Building 1546 (BLM) ***[FTWW-062{3A}]*** ***No further action.***	*IAP #:FTWW-062* *ADEC #:100231x026001* *TNK #227-233* *ADEC FILE Number: 108.26.009*	*A bioventing/air sparging treatment system was installed by FERtech Environmental Systems (FERtech) in the fall of 1994 to remediate the soil contamination at Building 1546. Prior to FERtech's bankruptcy, the treatment system operated for several months. Harding Lawson and Associates assumed the treatment system, conducted an assessment of the system, installed system modifications where required, and began running the system in the summer of 1995. Jan 99: System off to evaluate rebound. G/W below cleanup standards for four events. Will be evaluated for closure end 1999 season. Apr 01: System off, being moved. Closure letter received from State December 17, 1999. Reference UPC # FTW-125.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 1563	*IAP #: ADEC #:1992310029501 TNK #234 ADEC FILE Number108.26.039*	*ADEC closure was received removing this site from the Two-Party Agreement. ** A closure letter has been received from ADEC for the 125 cubic yards of soil removed from the tank excavation. A closure letter was received March 8, 2005.*
Building 1594	*IAP #: ADEC #: TNK # ADEC FILE Number*	*UST removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable*
Building 2060	*IAP#: ADEC#: TNK# ADEC FILE Number: 108.26.042*	*No GW samples in 2004. 2 Borings drilled within the contaminated zones.. 2005: Conditional Closure. 4 Additional soil borings being collected. NFRAP letter sent 30 NOV 2005*
Building 2080	*IAP #: ADEC #:199331x013304 TNK #247, 248 ADEC FILE Number 108.38.027, 108.26.027*	*ADEC closure was received removing this site from the Two-Party Agreement. A closure letter was received from ADEC February 8, 1994.*
Building 2092		
Building 2106	*IAP #: ADEC #: TNK # ADEC FILE Number*	*UST removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable*
Building 2108	*IAP #: ADEC #:1995310020302 TNK #253 ADEC FiLE Number: 108.26.045*	*ADEC closure was received for the site and the 22 cyds of thermally remediated soil. Closure letter dated January 31, 1996.*
Building 3011		*Information incomplete*
Building 3015 [FTWW-052; NFA] NFA based on signed PSE	*IAP #:ftww-052 ADEC #:199331x013301 TNK #264,265 ADEC FILE NUMBER: 108.26.026*	*ADEC closure was received for USTs 264 and 265 as well as the associated soils, which were thermally remediated. The Release Investigation recommending closure for the 8 seepage pits was delivered to ADEC. Reference UPC#: FTW096. ** A closure letter has been received from ADEC for the eight seepage.*
Building 3403	*IAP #: ADEC #: TNK # 266 ADEC FILE Number: 108.26.023*	*ADEC closure was received removing this site from the Two-Party Agreement. A closure letter was received January 31, 1996.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 3421	*IAP #:ftww-001 ADEC #:199331x013201 TNK #322 ADEC FILE Number: 108.26.018*	*ADEC closure was received May 26, 1995 removing this site from the Two-Party Agreement. An additional closure letter was received July 11, 2005.*
Building 3423 [FTWW-051; NFA]	*IAP #:ftww-051 ADEC #:199031x005901 TNK #269,270 ADEC FILE Number: 108.26.007*	*ADEC closure was received removing this site from the Two-Party Agreement. A closure letter was written January 31, 1996.*
Building 3471	*IAP #: ADEC #: TNK # ADEC FILE Number*	*USTs removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable*
Building 3479 [FTWW-090; NFA]	*IAP #: ADEC #: TNK # ADEC FILE Number*	*ADEC closure was received removing this site from the Two-Party Agreement*
Building 3484 VENC RI 1999(ENSR)	*IAP #: ADEC #: TNK # ADEC FILE Number:*	*Building 3484 has known POL contaimiants. The contamination was identified during an upgrade of piping & dispensers in 1998. The building is a fuel facility. Contaminated soil was removed in Aug 98; however, after-action samples indicated POL contamination still remained in soil and groundwater. An RI is ongoing and g/w monitoring will be conducted through 1999. Once results are analyzed, potential future action will be discussed with the State. Mar 99: The RI was discussed with the State. The RI indicated no contamination; State concurred that no action would be required.*
Building 3485		*Closed as a motorpool with a NFA document in OU5 ROD*
Buildiing 3487		*Closed as a motorpool with a NFA documents in the ou5 ROD*
Building 3724	*IAP# ADEC #: TNK#298 ADEC FILE Number: 108.26.048*	*Closed with a letterfrom ADEC dated March 8, 2005*
Building 4051 NFA	*IAP #: ADEC #:199531x034805 TNK #300 ADEC FILE Number: 108.26.038*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996. Work consisted of installing and sampling soil and groundwater probes. Based upon discussions between USARAK and ADEC on 5 Dec 96 and the RI report, ADEC has recommended closure. A closure letter was received from the State on December 17, 1999. Reference UPC # FTW125.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 4057 [FTWW-058; NFA]	*IAP #:ftww-058 ADEC #:199031x015702 TNK #303 ADEC FILE Number108.26.010*	*ADEC closure was received removing this site from the Two-Party Agreement with the OU5 ROD, April 6, 1999.*
Building 4065 [FTWW-059; NFA]	*IAP #:ftww-059 ADEC #:1996310002302 TNK #304,305 ADEC FILE Number: 108.26.003*	*USTs removed prior to 1988, ADEC closure under the Two-Party Agreement was received on April 6, 1999 in a No Further Action document.*
Building 4110A NFA VENC	*IAP #: ADEC #:199531x034806 TNK #307a ADEC FILE Number: 108.26.037*	*ADEC closure has been obtained for UST 307A and the associated 105 cubic yards of soils from the tank excavation. Although closure has been received for the UST at Building 4110A, the building will remain a Two-Party site until the separate contamination under the building is addressed. During the Site Assessment at Building 4110 a leaking product return line that served the extracted UST was discovered. Fuel discharge was reported to be confined to an area beneath the building and attributed to a loose fitting. The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996, and consisted of installing and sampling soil and groundwater probes. Based upon discussions between USARAK and ADEC on 5 Dec 96 on the preliminary findings, and the final RI report, ADEC has recommended closure. A closure letter was received from the State on December 17, 1999. Reference UPC # FTW125.*
Building 4110B Closed	*IAP #:ADEC #: TNK #307B ADEC FILE Number*	*Reference UPC # FTW125. ** A closure letter has been received from ADEC for Building 4110B, UST 307B and the associated soils.*
Building 4162	*IAP #: ADEC #:1990310020801 TNK #308 ADEC FILE Number: 108.26.033*	*ADEC closure was received on January 31, 1996, removing this site from the Two-Party Agreement. ADEC additionally completed a closure letter on May 24, 2005.*
Building 4247 [FTWW-060; NFA]	*IAP #:FTWW-060 ADEC #:199231X131001 TNK #309 ADEC FILE Number: 108.38.036*	*ADEC closure was received dJDanuary 31, 1996 removing this site from the Two-Party Agreement. ADEC completed a closure letter on May 26, 1995.*
Building 5004 [FTWW-061; NFA]	*IAP #:FTWW-061 ADEC #:199031X015701 TNK #310 ADEC FILE Number: 108.26.011*	*ADEC closure was received for the UST 310. Groundwater contamination suggests the possibility of an upgradient source. The investigation for the possible upgradient source was conducted under the Release Investigation for Buildings 5001 and 5003. The remediation of the upgradient groundwater contamination will be addressed with a soil vapor extraction/air sparging treatment system. The system is scheduled to be installed during the Fall of 1996, once Building 5001 has been demolished. ** A closure letter has been received from ADEC for the 74 cubic yards of soil removed from the tank excavation.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Birch Hill* *[FTWW-064; 2A; RI/FS]	*IAP #FTWW-064:* *ADEC #:199031X021807* *TNK #345-355* *ADEC FILE Number:* *108.26.002*	*ADEC closure was received for UST 355 removing this UST from the Two-Party Agreement. ADEC closure has not been obtained for the remaining nine sites located at the Birch Hill Tank Farm Site. The Release Investigation for the remaining nine sites located at the Birch Hill Tank Farm Site was conducted in July of 1995 to delineation the extent of contamination associated with the sites. Based on the findings of that investigation, a corrective action was determined to be unnecessary at the nine abandoned Birch Hill UST Tank Farm Sites, since the existing contamination poses no human health risk for site visitors or future site works. The Release Investigation recommends closure for the nine existing sites. Reference UPC # FTW111. ** A closure letter has been received from ADEC for the Birch Hill Tank Farm Site.*
Contaminated Soil 1	*IAP #:* *ADEC #:199031X021802* *TNK #* *ADEC FILE Number:* *108.26.023*	*ADEC closure was received removing this site from the Two-Party Agreement*
Petroleum Contaminated Soil Piles* *NFA	*IAP #:* *ADEC #:199231X033601* *TNK #* *ADEC FILE Number:198.26.016*	*ADEC closure has been obtained for the thermal remediation of the 18,000 cyds of contaminated soil generated for the time period of 1990-1991. The following soil piles, requiring remediation under the Linder Soil Bioremediation Contract, either via bioremediation or thermal desorption, are currently under remediation: Hanger 1, Utilidor Construction, Vehicle Wash Rack (Southeast End of the Runway), Bldg. 1565, Bldg. 2060 (UST 242), Bldg. 2062 (UST 244), Bldg. 2063 (UST 245), Bldg. 2092 (UST 249), Bldg. 3407 (UST 375), Bldg. 3492, Bldg. 3494, Bldg. 3564, Bldg. 4051, Bldg. 5001 (USTs 311, 312, and 314), Bldg. 5006 (UST 316), and Bldg. T-369 (UST 355). Closure of the above soil piles is pending confirmation closure samples showing the soil has been remediated. Reference UPC # FTW114. A closure letter is anticipated from ADEC on July 12, 1999, for the following soil piles, characterized as clean under the Linder Soil Bioremediation Contract: Bldg. 1002, Bldg. 1053, Bldg. 1060, Bldg. 1070, Bldg. 1130, Bldg. 1168 (UST 213), Bldg. 1191, Bldg. 1514, Bldg. 1563, Bldg. 2092 (500 gallon tank), Bldg. 3203, Bldg. 3584, Bldg. 4065 (UST 373), Bldg. 4110B, Bldg. 5001 (soils associated with USTs 357 and 358), Bldg. 5004, Bldg. 5110, BLM Warehouse Extension, Golf Course soils, Gravel Pit Site, North Post Site 3, North Post Site 4, and 801 Drum Site.*

Appendix G

Appendix G

Technical Memorandum, Birch Hill Tank Farm

Technical Memorandum

Birch Hill Tank Farm
Thaw Channel Groundwater Monitoring Plan
September 2006

This technical memorandum provides the status and update of discussions and agreements regarding the Thaw Channel Monitoring of Birch Hill Tank Farm.

Background

The property adjacent to the Birch Hill Tank Farm source area was sold in early 2006. The property was purchased by a housing developer for a new housing subdivision, Lazelle Estates. The Army had a right of entry (ROE) permit with the previous owner, Bentley Trust, which provided access to the Army to install and monitor groundwater wells. The new owner removed 8 monitoring wells in April 2006, six owned and installed by the Army and two installed and owned by the University of Alaska, Fairbanks (see Table 1). Only three of the Army's wells were scheduled to be sampled as part of the 2006 OU3 Groundwater Monitoring program for detection of potential off-site migration of contaminants. All six of the Army's wells had been sampled twice a year and no contaminants of concern above ROD levels had been detected since 2000. The UAF wells were installed as part of an early 1990's overall groundwater model for the Fairbanks area. These wells were not funded by the Army and have not historically been a part of the sampling program. Figure 1-*Approximate Locations of Monitoring Wells* shows all wells on the Bentley Trust land. Figure 2 - *Monitoring Well Locations dated 6/06* shows location of wells that have been included in the OU3 Monitoring Plan, the wells highlighted in red are the ones that were removed.

TABLE 1 Summary Table of Decommissioned Wells

Well ID	Lat	Long	Depth to Water (feet BTC)	Total Depth (feet BTC)	Material	Diameter	lbs Sand	lbs Bentonite	Pulled?	Volume Backfilled (ft^3)
AP-7946	64°51.395'	147°40.411'	DRY	18.6	PVC	2"	0	20	Y	0.41
AP-7947	64°51.413'	147°40.218'	13.5	68.7	PVC	2"	100	30	Y	1.50
AP-7948	64°51.413'	147°40.218'	13.5	41.0	PVC	2"	0	25	Y	0.89
AP-7950	64°51.402'	147°40.328'	34.3	37.0	PVC	2"	25	5	Y	0.81
AP-7951	64°51.359'	147°40.266	19.4	63.0	PVC	2"	75	20	Y	1.37
C-12	64°51.405'	147°40.130'	13.0	30.0	PVC	2"	50	5	Y	0.65
UAFML1	64°51.508	147°40.124	Unknown	30.0	PVC	2"	0	50	N	0.65
UAFML1	64°51.508	147°40.124	Unknown	60.0	PVC	2"	--	--	N	--
UAFML1	64°51.508	147°40.124	Unknown	90.0	PVC	2.5"	50	25	N	3.07
UAFML3	64°51.492'	147°40.419'	11.0	25.0	PVC	2"	0	30	N	0.55
UAFML3	64°51.492'	147°40.419'	11.0	50.0	PVC	2"	--	--	N	--
UAFML5	64°51.462'	147°40.410	20.5	37.0	Steel	2"	--	--	Y	--
UAFML6	64°51.448'	147°40.415'	20.7	32.0	Steel	2"	0	30	Y	0.70

BTC = Below Top of Casing -- = Decommissioning not completed, as noted in text.

Initial Technical Memorandum

Although the Army was in active discussions with the new owners to keep the wells on this property and obtain a new ROE, the new owner removed all wells on their property in April

2006. This action led to the development of the memorandum and subsequent updates. The first draft *Technical Memorandum, Birch Hill Tank Farm* was distributed via e-mail 31 May 2006. The initial Technical Memorandum summarized the discussions, actions and agreements of the 18 May 2006 conference call. Attendees included:

Army:	Cristal Fosbrook, Therese Deardorff, Mike Gieryic
ADEC (by phone):	Sharon Richmond
EPA(by phone):	Bill Adams, Mary Queitzsch
COE (by phone):	Bob Brock, Bob Hazlett

Updated Technical Memorandum

An updated Technical Memorandum was provided 30 June 2006 to the RPM's (Sharon Richmond, Bill Adams, Cristal Fosbrook and Therese Deardorff).

During the 9 August 2006 Federal Facility Meeting in Fairbanks, Alaska, groundwater information, modeling information, and a current status was provided. In additions, each action items was discussed and an update was provided. The most current update summarizes the agreements and future actions agreed to by the RPM's at the August 9, 2006 FFA.

The text in "bold" summarizes the original discussion and action that the Army would conduct. The updates, June and September, are provided for each of the issues regarding future off-post groundwater monitoring.

1. **Determine replacement of groundwater monitoring wells, location and number that are required for groundwater monitoring of the ongoing remedial actions at Birch Hill Tank Farm.**

   Prior to removal in April, six monitoring wells were being monitored on the former Bentley Trust Property. These wells include CRREL C12, AP7950, AP7946, AP7948, AP7951, and AP7947. These wells were sampled twice a year in accordance with the yearly Operable Unit 3 Work Plans; they were to be sampled twice in 2006 according to the 2006 Operable Unit 3 Work Plan. Groundwater monitoring did occur in April prior to the decommissioning of the wells by the builder, and all samples were below the RAOs set forth in the ROD and ESD.

   <u>Action</u>

   A new right-of-entry (ROE) will be requested by U.S. Army Garrison Alaska (USAGAK) to obtain access to the former Bentley Trust Land to install replacement wells. The request will be forwarded through USAGAK DPW Realty Officer, to the Army Corp of Engineers Real Estate Division, the Army's agent for ROE permits.

   A recommendation for number of wells and locations will be prepared by the Army Contractors for discussion and agreement by the Birch Hill Tank Farm Team

(ADEC, Army, EPA, COE and technical contractors). This request, which will include the recommended number of wells and proposed locations, will be completed and forwarded to COE Real Estate Office no later than July 15, 2006, in order to attempt to obtain the permit in time to complete the fall sampling events.

Update – June 30, 2006:

After further research and discussion, we are recommending that the Fall 2006 sampling event take place and data evaluated prior to determining the need for the off-post replacement wells. Of further concern is if we do request the ROE and obtain permission to install the wells, that if they are reinstalled during the construction process, they are likely to be destroyed. The potential for damage to new wells would remain even if the wells are flush mounted. These can be very expensive wells to reinstall and have to replace again in a short period of time. Waiting until construction is complete will also ease the process, as the approval for wells in roadways would be obtained through the city/borough instead of the current, construction landowner, thus streamlining the process.

Update – August 9, 2006

It was determined by the RPM's the location and number of replacement wells to be installed on the former Bentley Trust land will be evaluated when the new subdivision road system has been built. Utilizing information from modeling activities and the Birch Hill Summary report, locations will be determined by the RPM's. A ROE will be requested from the Fairbanks City/Borough for installations of the wells. Installing replacement wells in the road right-of-way would ensure the wells would not be disturbed or removed during the construction of the housing area. As of early September 2006, no site plan for this subdivision is available.

2. **Determine if the effects of permafrost disturbance on the former Bentley Trust Property might effect the groundwater direction and flow.**

Action

Complete up to four iterations of the Birch Hill thaw channel groundwater model utilizing varying states of permafrost properties. CRREL will develop four versions of the Earth Vision model simulating the thawing permafrost due to clear cutting. The new permafrost model will be incorporated into the Birch Hill Groundwater Model. These actions will require contract modifications to contracts held by CH2M Hill and Opalia (through CRREL). A contract-section schedule will be provided to the RPMs by June 15, 2006.

Update – June 2006

At the recent Birch Hill Summary Report Meeting, four scenarios were developed for modeling the groundwater direction and flow at the base of the hill. CH2M Hill, along with Opalia, will prepare two simulations to present during the 7 August 06 Birch Hill

Summary Meeting in Fairbanks. The two scenarios include updating the 2003 model by adding current information on groundwater elevations, installations of the three new wells and latest permafrost information; and, the second, a scenario that includes the absence of all permafrost on the former Bentley Property. Two other scenarios, permafrost melting below the water table and above the bedrock and permafrost melting from the groundwater source, are being considered for future modeling and will be discussed in August. If additional model runs are required, CH2M Hill and Ophalia will complete by the fall FFA.

Update – August 2006

CH2M Hill and Opalia provided presentations on the Influence of Permafrost Degradation on Groundwater Flow, Birch Hill Tank Farm. Two simulations of the groundwater model were presented, (1) an update of the current permafrost distribution and fault conditions and (2) all permafrost conditions had degraded and all faults would act as conduit for groundwater flow. It was determined that the second scenario would be unlikely.

It was determined by the team that two additional iterations of the groundwater and permafrost model would useful. One new permafrost model will be revised to assume approximately a 30% degradation of permafrost, based on a recommendation by a permafrost scientist. The second new iteration of the groundwater will be conducted with all faults frozen. These models will be presented at the fall FFA in December.

3. **Increase sampling of wells currently sampled IAW the current (2006) Work Plan in the Thaw Channel area from semi-annual to quarterly. Evaluate wells in the immediate area of the Thaw Channel and determine if other wells would assist in the on-going evaluation of groundwater fate and transport.**

ACTION

Groundwater sampling is scheduled to take place in late August or early September. Fairbanks Environmental Services (FES), the current groundwater contractor for the tank farm, will make recommendations to the Team and the RPMs to determine if additional wells will assist in determining groundwater fate and transport. This recommendation will be provided by June 30, 2006.

Update – June 2006

There are two remaining wells located off-post in the Thaw Channel area, both are located on the Shannon Park Baptist Church property. Although it hasn't been sampled for several years per agreement by the RPMs due to consistent non-detects, the Steese Chapel water well also remains available for sampling. There are currently six on-post wells (one of which is a multi-ported well) that are included in the semi-annual groundwater sampling program. A groundwater probe (GWP-98D), which has not been recently sampled, is also located in this area. The wells are screened across a variety of groundwater depths, in both the alluvial and bedrock aquifers. Historically, five of the *wells (the two wells located on the Shannon Park Baptist property and three wells on post) have exceeded the MCL for DCA—although none have exceeded the MCL in the last few years. If the RPMs decide to increase the sampling program to quarterly, it is recommended that these five wells be included (Shannon Park drinking water well, UAFML-7, AP-7844, AP-7845, and AP-5782). This effort can be completed during the fall sampling event. All of these wells are screened within the alluvial aquifer. Figure 2 shows the locations of these wells on an aerial photograph.*

Update – August 2006

Fairbanks Environmental Service (FES) conducted sampling of five wells off post in April prior to their removal by the new owners, and the two remaining wells in July. In addition to off post sampling, six on post wells (one of which is a multi-port well) were sampled in both July and August 2006. Sampling results have remained consistent with previous events; a "spider diagram" displaying results was distributed at the meeting. The sampling frequencies of these wells have been increased to quarterly.

4. **Install a replacement groundwater well on Fort Wainwright property to replace well number C-12.**

Action

Installation of a groundwater monitoring well on Fort Wainwright to replace C-12. This will be completed in time to be sampled as part of the late August groundwater sampling event. FES will provide a schedule for installation with recommendations of the well location and depth to the RPMs by June 30, 2006.

Update – June 2006

After further research and evaluation, we are recommending this well not be replaced at this time. There appear to be adequate monitoring points in this area already, particularly since DCA concentrations have been declining or stable over the last few years. AP-5782 was screened at the same approximately depth as the decommissioned C-12 well. AP-7844 and AP-7845 are both screened slightly deeper than C-12, but are spatially closer to the former location of C-12. GWP-98D, which was installed in 1997 as part of the vertical profiling effort, is also located very close to the former location of C-12. Based on boring logs in adjacent wells, this probe appears to have been screened into bedrock. Figure 3 shows the relative depths of wells/probes in the Thaw Channel area. This has led to the above recommendation.

Update – August 2006

The RPM's are in agreement with the recommendation.

5. **Evaluate the effectiveness and need to re-start the Thaw Channel air-sparging system.**

Action

FES will provide recommendations to RPMs regarding the pros and cons of operating the Thaw Channel air-sparge system. This will be completed by June 30, 2006.

Update – June 2006

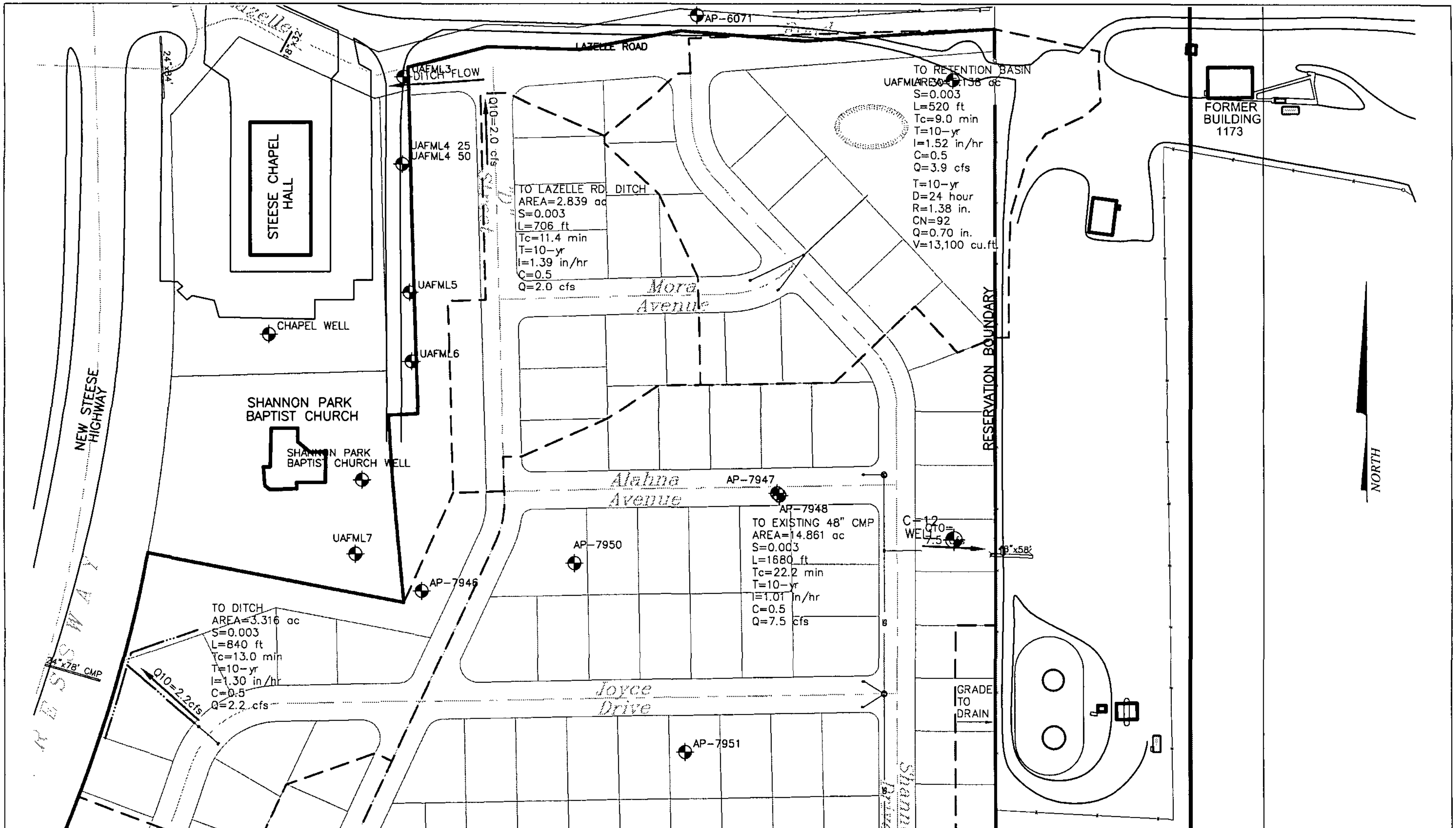
After further research and evaluation, we recommend not restarting the Thaw Channel system unless, or until, there is an increasing trend contaminant concentrations on post. A decision to restart the system will include consideration of the following:

- *Effectiveness of the system in reducing contaminant concentrations in this area. As of now, it is unclear of whether this system has been responsible for decreasing contaminant concentrations in the past. A sparge curtain treatment strategy is most effective treating contaminants primarily concentrated near the water table. Contamination in this area has been shown to be more concentrated at deeper depths (at the bedrock interface).*

- *Restarting of the system now will results in disruption of the current rebound evaluation that began last fall, part of which would help determine its effectiveness.*

Update – August 2006

The RPM's are in agreement with the recommendation.



0 200 400

Scale in Feet

LEGEND

AP-7951 — MONITORING WELL

FAIRBANKS ENVIRONMENTAL SERVICES
748 GAFFNEY ROAD, SUITE 200
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

Approximate Locations of Monitoring Wells

Operable Unit 3
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
W911KB-05-D-0006	1	9/06

mw overlay

FAIRBANKS ENVIRONMENTAL SERVICES
748 GAFFNEY ROAD, SUITE 200
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

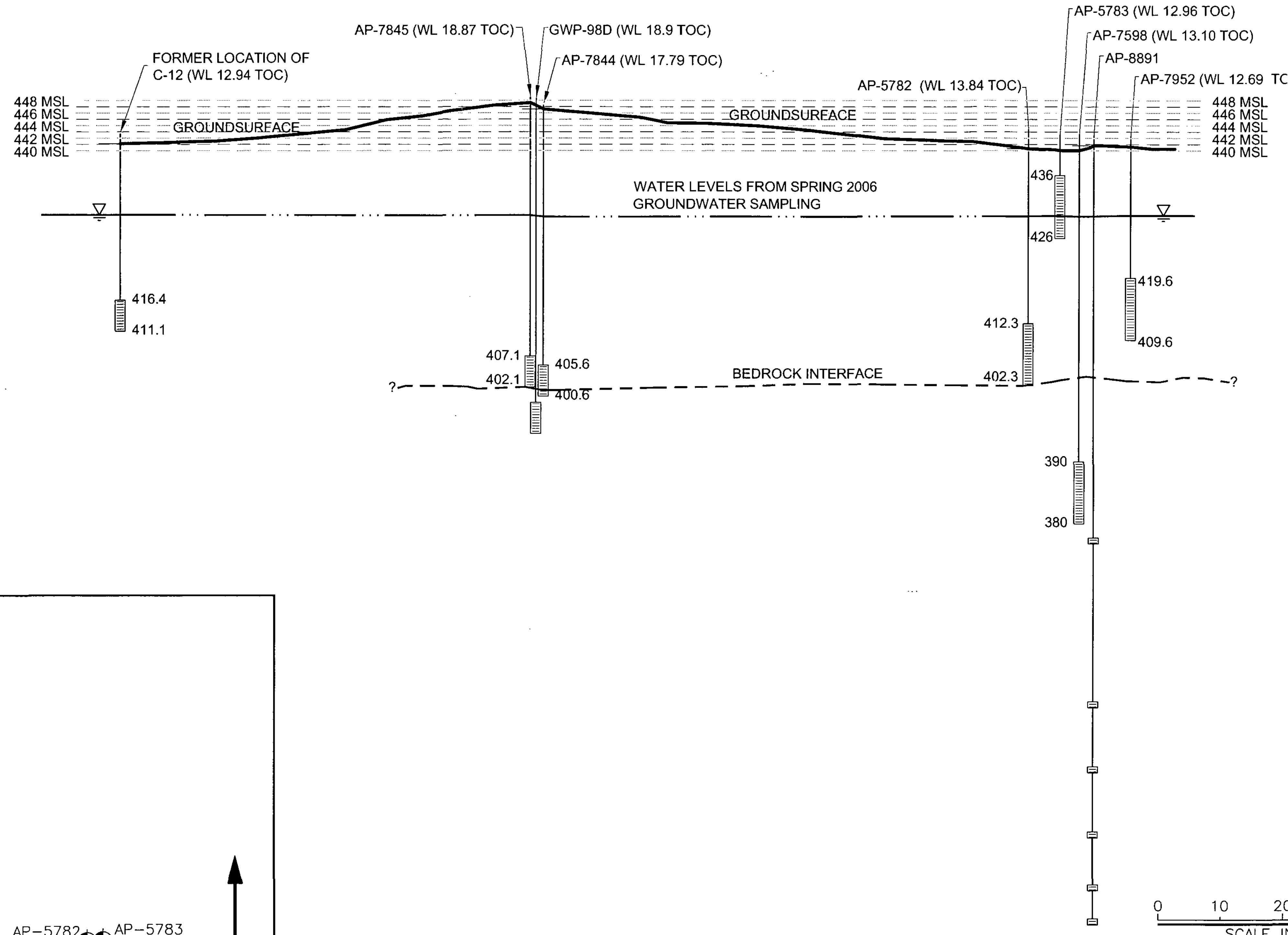
Monitoring Well Locations Dated 6/06

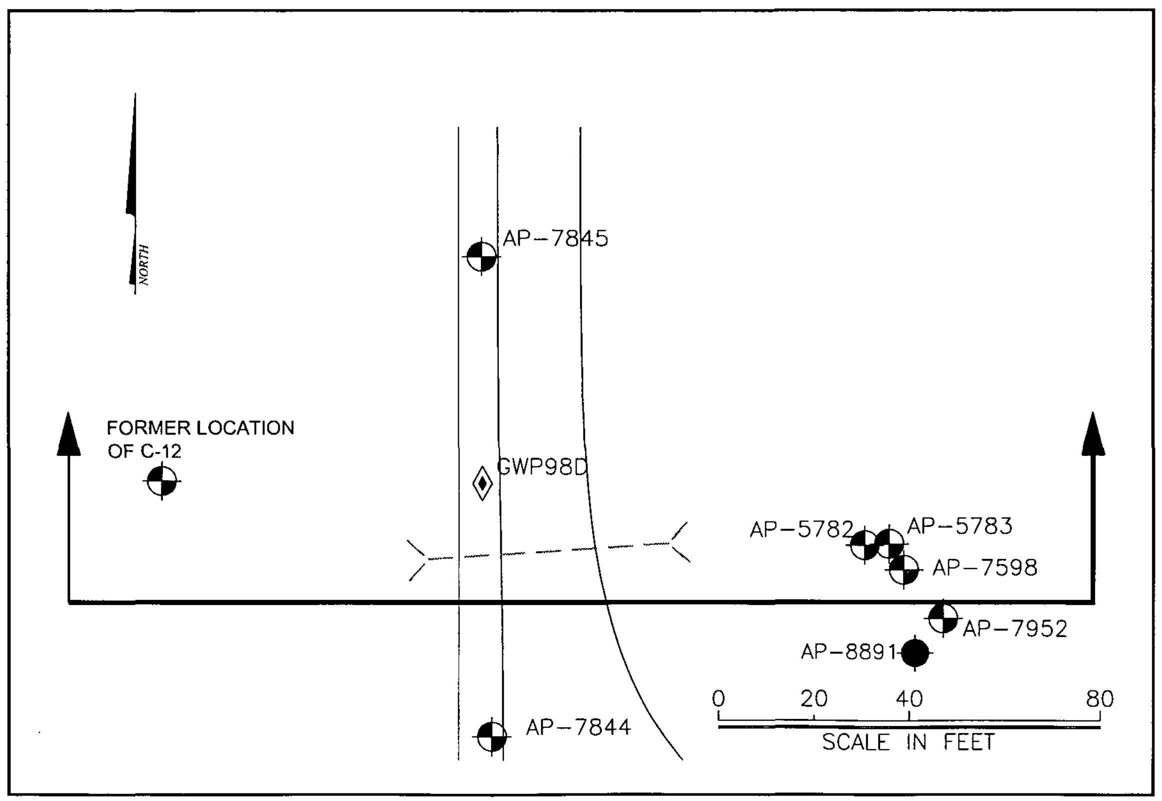
Thaw Channel Treatment System

Operable Unit 3
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
W911KB-05-D-0006	2	9/06

Aerial tc





NOTE

ELEVATIONS SHOWN IN NAVD 88 DATUM

LEGEND

AP-5783 MONITORING WELL LOCATION

FAIRBANKS ENVIRONMENTAL SERVICES
748 GAFFNEY ROAD, SUITE 200
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

Approximate Screen Elevations at Thaw Channel

Operable Unit 3
Fort Wainwright, Alaska

CONTRACT: W911KB-05-D-0006	FIGURE: 3	DATE: 9/06

BHTF WELLS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WA 98101

TARGET SHEET

The following document was not imaged.
This is due to the Original being:

____	Oversized
X	CD Rom
____	Computer Disk
____	Video Tape
	Other: ____________

**A copy of the document may be requested from the Superfund Records Center.

Document Information

Document ID #: 1231650

File #: FTWFF 19.4

Site Name: Fort Wainwright, US Army

Five Year Review Report
Second Five Year Review Report for
Fort Wainwright, Alaska